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ABSTRACT

The overall goals of this project, held at Governors State University in Illinois, were to upgrade knowledge of all aspects of environmental problems; to increase knowledge of and skill in the use of environmental strategies and materials; and to enhance knowledge and skill in leadership roles. A number of behavioral objectives were also identified. The project was organized into ten workshops held in and around the Chicago area. Workshop topics included ecology, simulations, energy, and economics. Each of the ten workshops are described in detail in the book. The following information is provided for each workshop: (1) an overview, (2) objectives, (3) some suggested activities, (4) suggested evaluation ideas, and (5) resources. Also reported is a short chronicle of district environmental education programs provided by each participant. Evaluation of the project was based on pre- and posttests of attitudes toward teaching strategies, posttests on environmental attitudes given to experimental and control groups, individual written evaluations of each workshop, and a log. Appendices include the workshop evaluation sheet, the Illinois state plan for environmental education, advisory board members, and a list of games. (MA)

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Environmental Education Leadership Development Project

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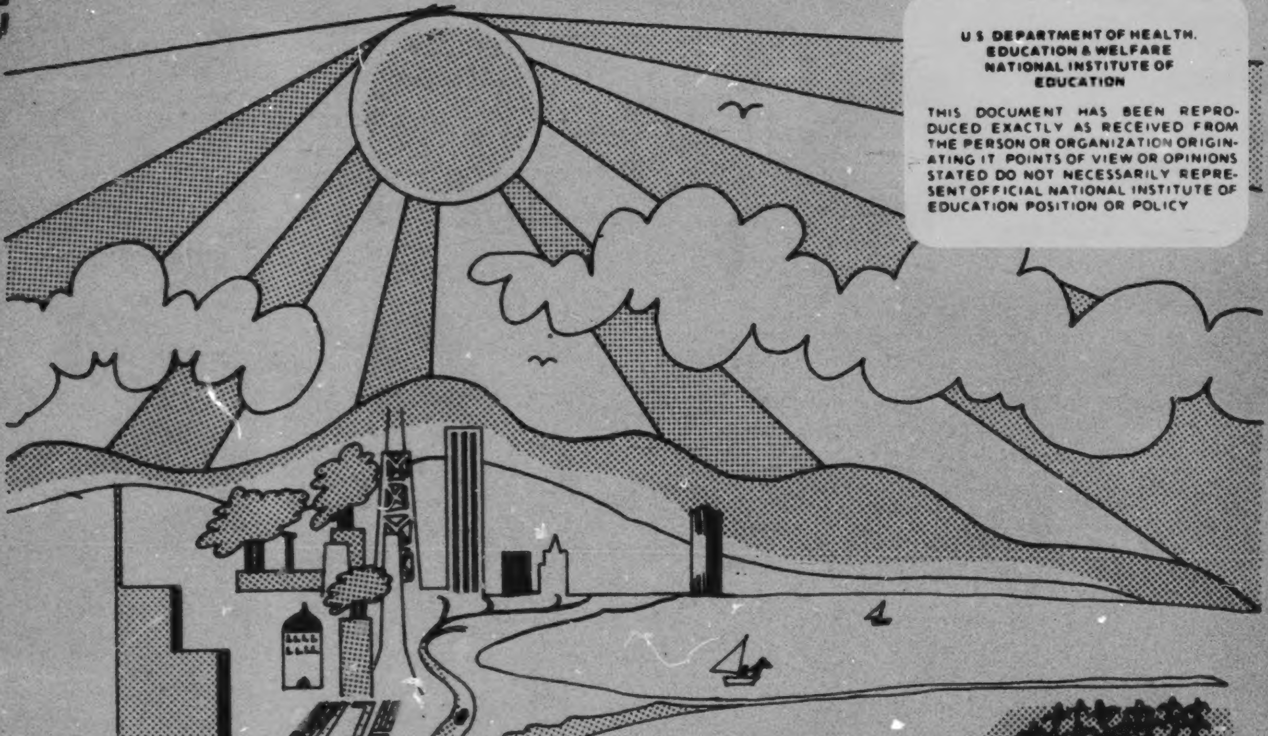

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The College of Environmental and Applied Sciences
Governors State University
Park Forest South, Illinois 60466

Participants

The following people were selected from applicants to participate after discussions with them and with their district administrators.

Participants	School and City
Haskell Brown Zachary Bernard	John Hersey High School, School District 214 Arlington Heights, Illinois
Marie Hessling Kenneth Costenson	Aurora West High School, School District 129 Aurora, Illinois
Nancy Carlson	Eisenhower High School, School District 218 Blue Island, Illinois
Kenneth Mercury	Northwest High School, School District 218 Worth, Illinois
William Caton Roger Schoob James Dollinger	Bolingbrook High School, School District 365-U Bolingbrook, Illinois
Everett Branson Billie Caldwell	DuSable High School, School District 13 Chicago, Illinois
Evangeline Taylor	Overton School, School District 13 Chicago, Illinois
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Elizabeth Jones Thomas Korn	Crete-Monee Schools, School District 201-U Crete, Illinois
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ENVIRONMENTAL EDUCATION LEADERSHIP DEVELOPMENT PROJECT

Final Report

A Guidebook to In-service Environmental Education Workshops for Teachers

Project Director: James Joseph Gallagher
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Park Forest South, Illinois 60466

Project supported jointly by:
Division of Technology and Environmental Education
United States Office of Education
Washington, D.C. 20202

and

Board of Governors of State Colleges and Universities
Springfield, Illinois 62701

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Forward

This Guidebook to In-Service Environmental Education Workshops for Teachers has been prepared as the Final Report of the Environmental Education Leadership Development Project, a project funded jointly by the U.S. Office of Education, Division of Technology and Environmental Education, and the Illinois Board of Governors of State Colleges and Universities. The Project was conducted from June 23, 1974 - June 22, 1975 at Governors State University, Park Forest South, Illinois, under the direction of Dr. James Joseph Gallagher.

This report serves as a compilation of the outcomes of the Project prepared in a format that will be helpful to others who are responsible for the in-service education of teachers in environmental education. The report was prepared by Dr. Gallagher; Dr. Leon Zalewski, Environmental Curriculum Circuit Rider for the Project; Ronald Olson, a participating teacher in the Project; and Paula Colaric, Graduate Assistant. Editorial supervision was provided by Elizabeth Swartz; art work was done by Gail Grigsby; and Jay Williams served as layout advisor.

James Joseph Gallagher
Park Forest South
September 1975

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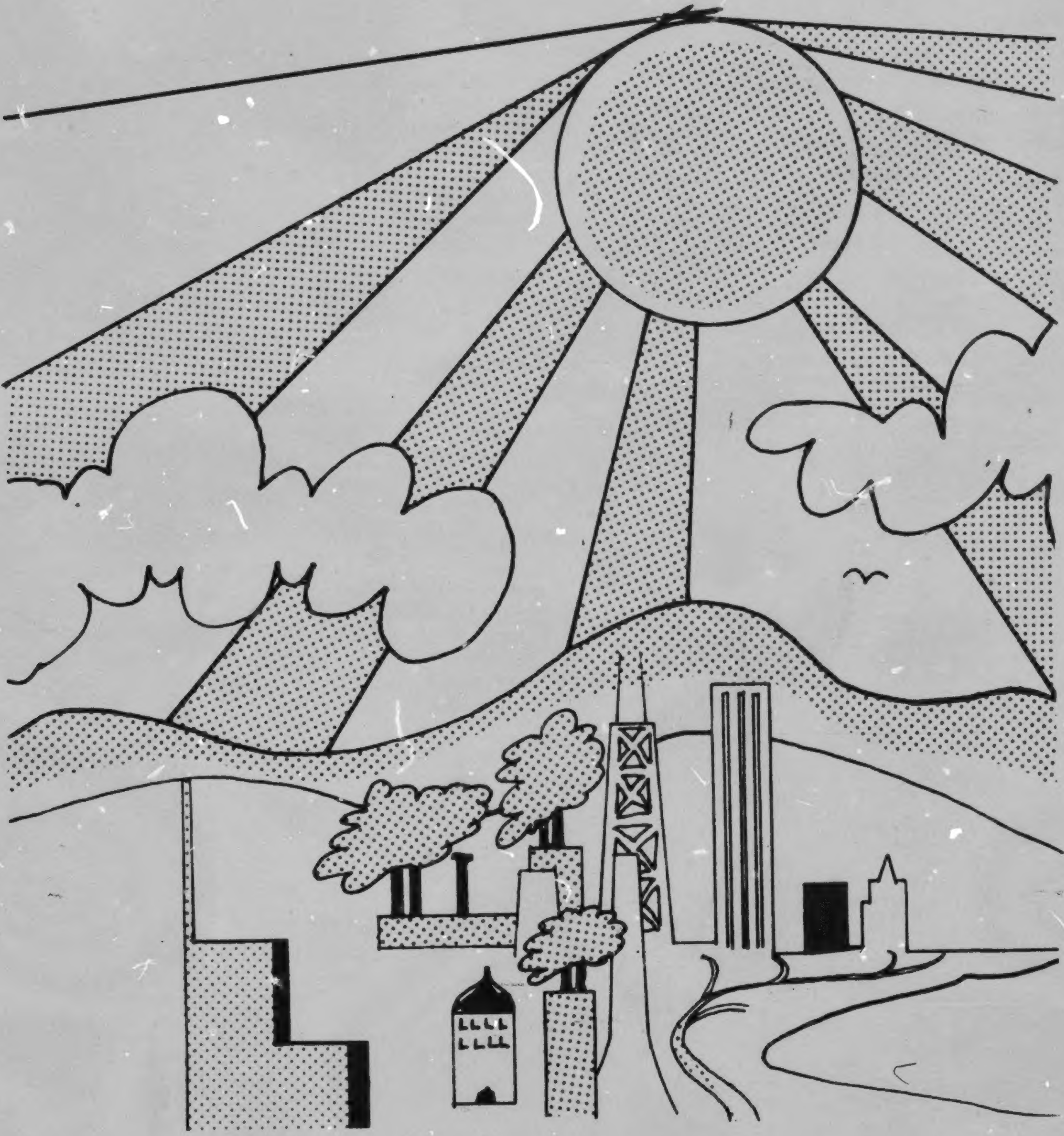
I Why an Environmental Education Leadership Development Project?



During recent years environmental concerns have been popularized and incorporated into school curricula with increasing frequency. Underlying these concerns is a complex array of interlocking issues based in ecology, economics, biology, politics, chemistry, psychology, land-use planning, ethics, aesthetics and many other areas of natural science, social science and humanities. Many people are recognizing the need for alerting students to the complex nature of environmental issues to enable them to become more informed citizens and voters who will be able to make wise choices in their personal activities and collective decisions.

In response, instructional planners, educational materials developers and publishers have made available a wide variety of textbooks, resource materials, films, simulations, games and other materials for classroom use. However, all of these materials require competent teachers who understand the complexity of environmental matters and can orchestrate these elements into a curriculum that will help students acquire knowledge, attitudes, and skills necessary to deal with current and future challenges.

Unfortunately, due to the recency of the popularization of environmental concerns, few teachers have the background needed to effectively implement a curriculum which deals with environmental issues from a multidisciplinary point of view. Most secondary teachers are specialists in one discipline such as science, social studies, English or art and lack breadth in preparation to address environmental concerns from other perspectives. Elementary teachers, on the other hand, frequently deal with all disciplines but many lack the depth of background, especially in science, needed to deal with contemporary environmental issues. Thus, if environmental education is to become part of the school curriculum, much work needs to be done to re-educate teachers so that they acquire knowledge, attitudes and skills needed to help students. A means is needed by which classroom teachers can sufficiently upgrade their background so that they are able to: (1) make valid decisions when planning for the infusion of environmental education into their own school, and (2) devise strategies for implementing these plans effectively.

The task is a sizable one, partly because of the complexity and interrelatedness of the knowledge which bears on environmental education and partly because of the number of teachers who need to be re-educated. Little can be done to reduce the magnitude of the former component, but the latter can be made more manageable by helping some of the more professionally concerned classroom teachers develop potential as environmental education leaders who possess both the knowledge and skills needed to aid other classroom teachers in improving environmental education in their school districts. It was in this context that the Environmental Education Leadership Development Project was formulated.

This Project was devised to foster infusion of improved environmental education into the total curriculum of secondary school districts. It was a model program for upgrading knowledge and skills of professionally concerned secondary school teachers so they could assume the role of local school district leaders in environmental education. The overall goals of the project were:

1. To upgrade knowledge of the causes, consequences and ways of solving environmental problems.
2. To increase knowledge of and skill in using materials and strategies for environmental education.
3. To enhance knowledge and skill in leadership roles and change agentry.

Expected competencies (objectives) for participants were established. These were classified in three groups--environment-related objectives, education-related objectives and leadership-related objectives as follows:

Environment-related Objectives: On completing the program for development of environmental education leadership personnel, each participant should be able to:

1. demonstrate conceptual and practical knowledge about the natural and human-altered environments and their interrelationships. For example, each participant should be able to:
    a. describe and apply principles and concepts of ecology, chemistry, environmental planning, economics, sociology and other disciplines to environmental problems.

b. utilize concepts and principles from several disciplines as tools for interpreting local environmental problems and understanding their relationship within larger contexts.

2. describe and analyze contemporary environmental problems in terms of natural science and social science principles and relationships. For example, each participant should be able to:

a. read and interpret an environmental impact statement.

b. identify a specific environmental problem and analyze it in terms of natural science and social science concepts.

c. formulate a description of a specific environmental problem based on concepts from the natural and social sciences.

d. demonstrate a methodology for assessing environmental developments in terms of social, cultural and ecological indicators.

3. utilize a variety of techniques of problem-solving and decision-making. For example, each participant should be able to:

a. identify alternative solutions to an environmental problem.

b. evaluate these alternatives in terms of immediate and long range consequences.

c. make judgments on desirability of one alternative over another based upon consequences.

d. recognize the role of human values in decision-making.

e. describe how problem-solving and decision-making techniques can be generalized to new problems.

f. identify constraints in generalizing problem-solving and decision-making techniques.

4. define values positions for current environmental issues. For example, each participant should be able to:

a. describe a variety of values systems which influence actions regarding the environment.

b. infer values systems of opponents in an environmental controversy.

c. identify behavioral consequences of a specified values position.

Education-Related Objectives: On completing the program, each participant should be able to:

5. assess the quality of available instructional materials for environmental education in terms of educationally and environmentally sound criteria. For example, each participant should be able to:
    a. describe several examples of commercially available environmental education programs and instructional materials.
    b. interpret the philosophy and rationale on which these examples of materials are based.
    c. formulate criteria for assessing the quality of environmental education instructional materials.
    d. make judgments about the appropriateness of materials by analyzing the relationship of the philosophy and rationale of materials with his school's environmental education objectives.
6. demonstrate a repertoire of techniques for organizing and implementing instruction using the environment. For example, each participant should be able to:
    a. demonstrate skills in conducting field studies with secondary school students.
    b. demonstrate techniques of helping students clarify values, their origins and consequences.
    c. utilize standard techniques for environmental analysis appropriate for secondary school level.
    d. utilize contemporary techniques such as simulation and gaming, applicable to environmental education.

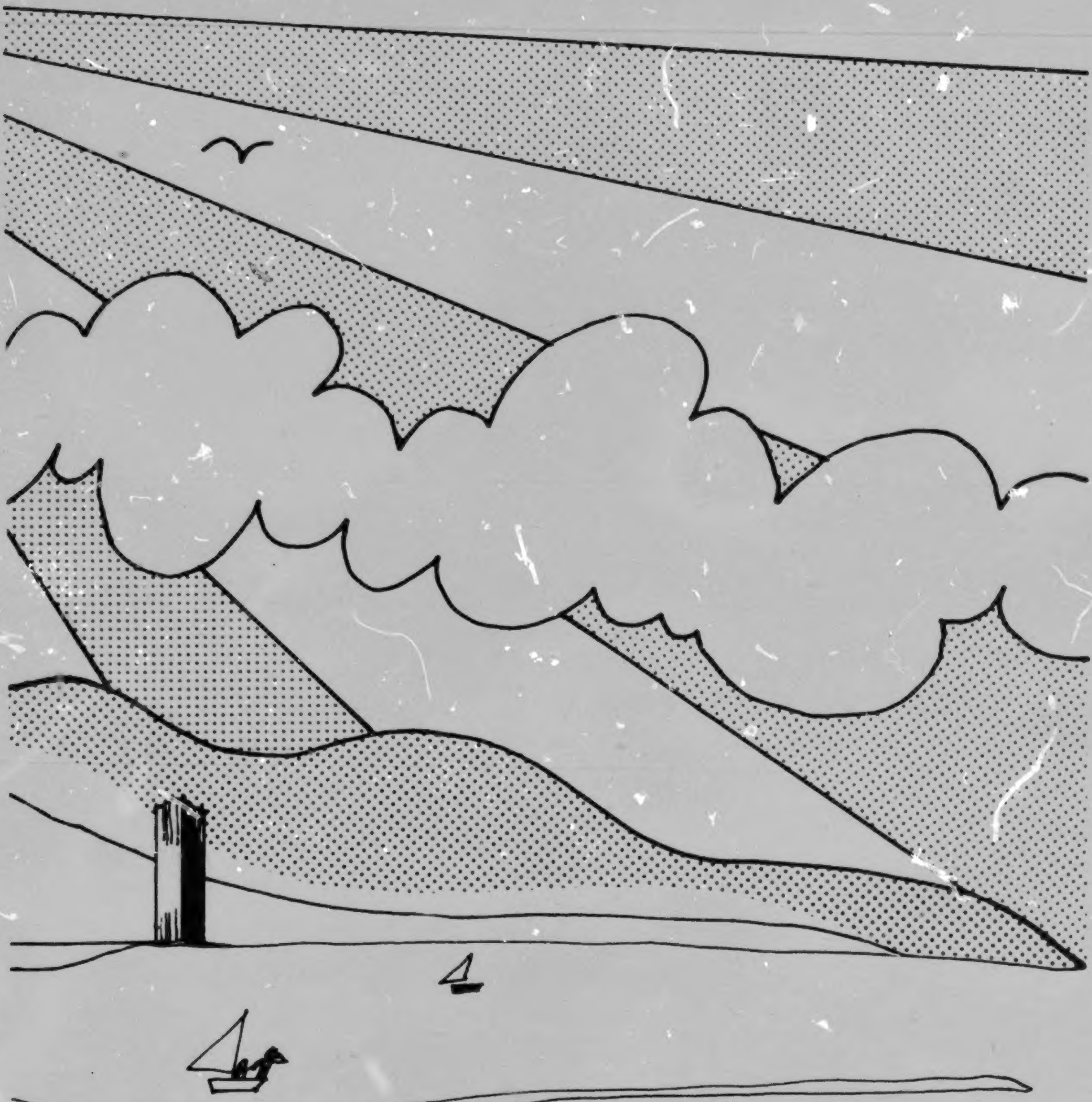
Leadership-Related Objectives: On completing the program, each participant should be able to:

7. demonstrate ability to formulate a generalized plan for infusion of environmental education into the curriculum. For example, each participant should be able to:
    a. write a set of general objectives for an environmental education program, course or unit.
    b. identify strategies for helping students achieve these objectives.
    c. determine procedures for implementing and evaluating proposed strategies.
8. utilize processes for initiating, implementing, and evaluating changes in instructional programs. For example, each participant should be able to:
    a. describe major concepts and processes of change agentry.
    b. formulate a plan for introducing an instructional innovation in environmental education.

c. provide leadership and support for other classroom teachers who are attempting a new approach to environmental education.

d. serve as a clearing house for environmental education information and resources.

II Project Description



The target area for the project was determined by the fact that one-half of the teachers in the State of Illinois and at least one-fourth of those from Indiana live and work within an hour's drive of the Governors State University campus. This includes teachers from the central cities of Gary and Chicago, the vast suburban ring of greater Chicago, autonomous cities like Joliet and Kankakee, and rural communities which lie to the south and west of Chicago (Figure 1).

Within this area, the project staff worked to identify teams of dedicated, professional science and social studies teachers who wished to work jointly to develop their capabilities and serve as "grass roots" leadership personnel for initiating or improving environmental education in their home school districts. In addition to team members' personal interests, their school district had to be willing to make a commitment to environmental education by supporting limited release time to permit participation in ten day-long in-service sessions and, further, by then utilizing the teachers' newly-acquired skills in making district-wide improvements in environmental education.

In selecting participants, the project staff sought a balanced distribution of districts in terms of geography and population density so that the newly developed leadership personnel could provide a demonstration and leadership function for an area surrounding their home district as well as within their district. In this way, the long-term benefits of this project would be enhanced.

The project ran for one year beginning June 23, 1974 and consisted of three somewhat overlapping phases: Planning and Development, Implementation, and Evaluation. Phase I, Planning and Development, took place in July, August and September. During this phase, program planning and participant recruitment occurred. School districts in the greater Chicago metropolitan area were contacted to determine their interest and willingness to participate and provide the necessary support. Simultaneously with recruitment, planning and development of the program took place.

Phase II, Implementation, began October 1 and continued through May. This was a two-pronged effort at aiding participants in developing leadership skills

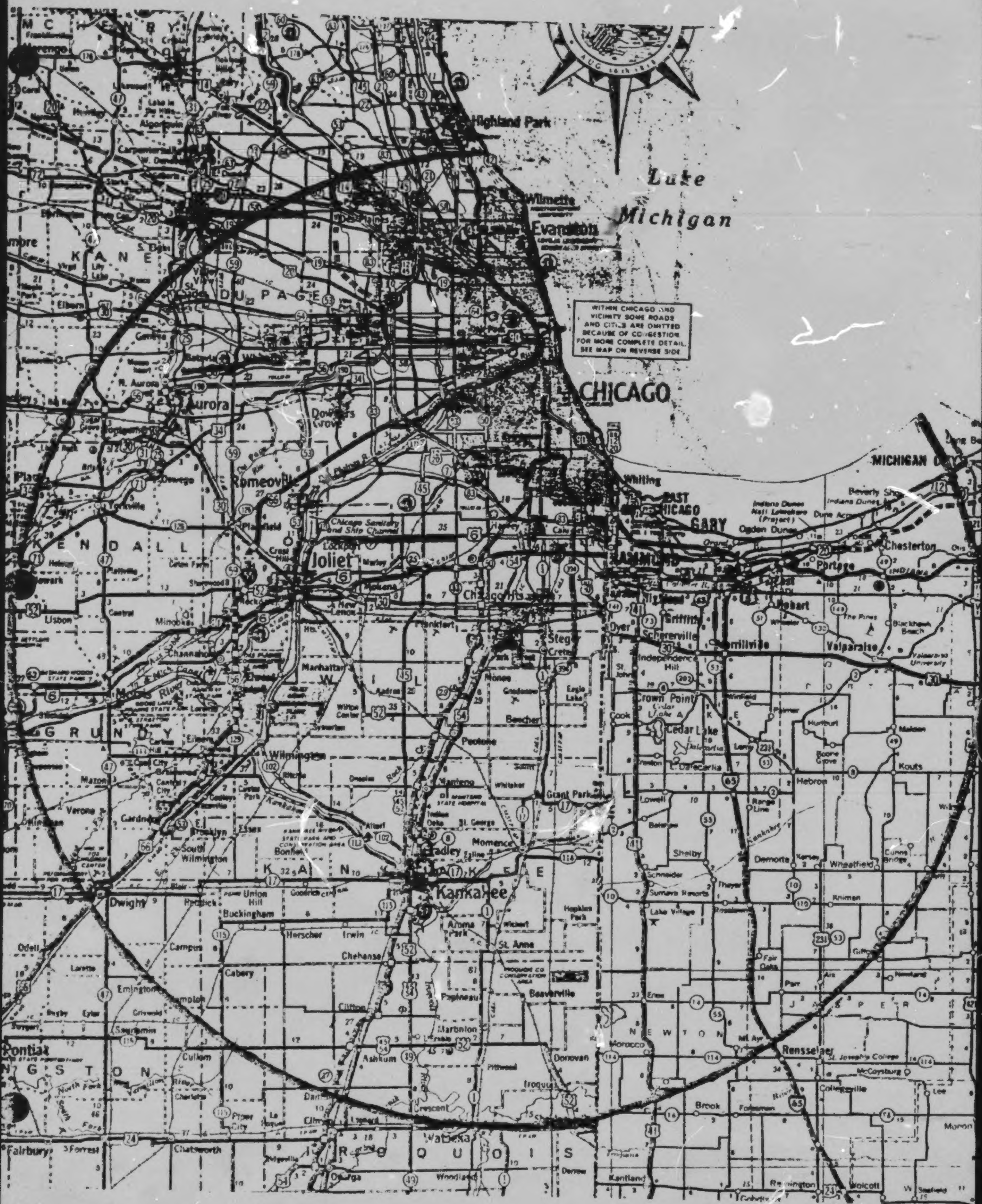

Lake Michigan
WITHIN CHICAGO AND VICINITY SOME ROADS AND CITIES ARE OMITTED BECAUSE OF CONGESTION. FOR MORE COMPLETE DETAIL, SEE MAP ON REVERSE SIDE
CHICAGO
Highland Park
Wilmette
Evanston
MICHIGAN CITY
Whiting
EAST CHICAGO
GARY
HAMMOND
Chesterton
Portage
Hobart
Valparaiso
Crown Point
Cedar Lake
Merrillville
Schererville
Dyer
Lowell
Hebron
Kouts
Rensselaer
Aurora
N. Aurora
Downers Grove
Romeoville
Plainfield
Joliet
Lockport
Chicago Hts
Steger
Crete
Frankfort
Mokena
New Lenox
Peotone
Beecher
Manteno
Wilmington
Braidwood
Coal City
Gardner
Dwight
Bradley
Momence
Kankakee
St. Anne
Herscher
Chebanse
Clifton
Ashkum
Watseka
Onarga
Pontiac
Fairbury
Chatsworth
Forrest
Morocco
Kentland
Remington
Wolcott
KANE
DU PAGE
KENDALL
GRUNDY
WILL
KANKAKEE
IROQUOIS
NEWTON
JASPER
PORTER

Figure 1 - Target Area

in environmental education. One part consisted of ten day-long in-service workshops at the University. The second consisted of periodic visits to participating school districts by the Project's Environmental Curriculum Circuit Rider.

University Workshops

During each of these sessions, participants were engaged in activities designed to:

1. improve knowledge, skills and techniques related to the broad disciplinary and interdisciplinary content of environmental sciences (described in objectives 1-4).
2. increase knowledge and skills relating to environmental education in secondary schools (objectives 5-6).
3. enhance knowledge and skills in leadership including concepts on change agentry, and the dynamics of educational innovation (objectives 7-8).

These objectives were achieved by engaging participants in learning activities designed for them by members of the college's multi-disciplinary faculty, including the project staff and:

1. an analytical chemist specializing in an air and water pollution analysis
2. a biologist
3. an ecological psychologist
4. an environmental planner
5. a political scientist
6. a geochemist
7. an economist
8. an ecologist
9. a management specialist
10. a specialist in environmental legislation and lobbying

During the in-service sessions participants were given opportunities in laboratory work, field work, development of skills in analysis of polluted air, water and soil, participation in multi-disciplinary and ecological studies, consideration of legal, ethical, and economic consequences of environmental problems and their resolution, study of urban, suburban and rural environments, study of environmental education materials, curriculum planning and utilizing materials from the University's multi-media Learning Resources Center.

The schedule and subject areas for the ten university-based sessions include the following:

ORGANIZATIONAL FRAMEWORK

Environmental Education Leadership Development Project

University Workshops	Subject of Workshop
October 8	Introduction to the Project; Scope of Environmental Education
October 29	Leadership Development; Basic Ecology
November 19	Human Ecology; Environmental Planning
December 10	Planning Environmental Education; Simulation and Games
January 14	Environmental Education - A Process Approach
February 4	Energy
February 25	Air and Water Pollution
March 25	Phenology and Man's Relation to the Environment
April 15	Economics, Future Environments and Lifestyles
May 6	Agencies and Laws for Environmental Improvement

All of the workshops were organized to address each of the three broad objectives of the project: (1) improvement of participants' knowledge base about environmental issues; (2) improvement of instructional and curriculum planning skills; and (3) improvement of leadership skills. All workshops involved a variety of activities for the participants in a rather intensive atmosphere due in part to the time of day and the nature of the participants.

A typical workshop day found the participants arriving at Governors State University between 2:00-2:30 P.M. This odd hour for convening was necessary because during recruitment it was learned that school districts were not able to provide substitutes to release teachers for an entire day. Upon arrival, the participants received a packet of materials pertinent to that workshop's agenda, plus appropriate supportive materials. In order to revitalize the participants after their long teaching day and trip to campus, various types of assorted refreshments were made available to get everyone ready to participate in the workshop's activities. The refreshments provided, ranged from the usual cookies, sweet rolls, tea, coffee and juice to the unusual and most popular organic food snacks, such as salted and unsalted sunflower seeds, dry roasted soybeans, toasted and salted soybeans, dates, fresh whole strawberries and sassafras tea. Having this informal arrival time provided a necessary period of relaxing and socializing which the participants valued throughout the year.

The workshop was brought to order usually between 2:30-2:45 P.M. Once the workshop started, activities continued until 6:00 P.M., when a 45-minute dinner break occurred. The evening meal was provided free to all participants of the workshop. This plus a mileage stipend of 12¢ per mile for each trip to campus and back home helped offset some of the costs for each participant.

After dinner, the workshop activities would continue usually until 10:00 or 10:30 P.M. All of the workshops were high intensity and activity-based. During the last fifteen minutes of each workshop the participants evaluated the day's agenda and made comments and suggestions that would be utilized in planning subsequent workshops (Appendix A Sample Evaluation Form). Detailed plans for each workshop follows in Section III.

The Circuit Rider

The second part of the Implementation Phase was comprised of cooperative work in the participating school districts. This involved each district's team of participating teachers, other teachers, administrators, staff, and students, and the Environmental Curriculum Circuit Rider. Work included planning, developing and implementing a program for environmental education in the participants' school districts. To initiate the work in each school district, participating teachers utilized leadership skills, curriculum content skills, and teaching strategies learned in the on-campus sessions. In addition, the Project's environmental curriculum specialist, Dr. Leon Zalewski, the Environmental Curriculum Circuit Rider, served as facilitator between Governors State University, school district officials, and the participating faculty teams. In this role, he worked in the school districts to aid participants in definition, refinement, implementation, and evaluation of their own environmental education program. The Circuit Rider visited all of the participants every three weeks from October through June; where problems and conflicts arose, more frequent visits were scheduled.

The following guidelines were formulated to govern school district visitations and activities of the Circuit Rider:

1. Principals, supervisors and participating teams were notified in advance, by mail or by phone, of intended visits to school districts.
2. Program activities were specified at the time of notification.
3. In-service workshops for faculty members in individual school districts required two-week advance notification from participating teams. Workshop scheduling occurred on a first-come, first-served basis.
4. Participating teams were encouraged to organize a minimum of two district-wide workshops with the help of the Circuit Rider.
5. All visitations to schools or district facilities by the Circuit Rider were begun with a brief visit to the school office or authorized person.

In each of the field-based meetings the work was planned individually for each school district by the team of participants, school district officials, and the Circuit Rider. Each district was unique and progress was different in each. Smaller districts were able to respond more quickly, while in the large districts, like the city of Chicago, communication and response was slow due to size, but not due to lack of interest. Because of his enthusiasm and dedication, the Circuit Rider was successful in achieving such a high level of involvement and excellent success in each of the sixteen co-operating districts. Reports of work in selected districts are included in Section IV.

III Plans for Workshops

Each of the ten Workshops is described in a way that is intended to assist others in developing and conducting an in-service program for teachers. For each Workshop the following information is provided:

An Overview: describing the content and strategies used in that Workshop.

Objectives: describing the intended outcomes of the Workshop.

Some Suggested Activites: including several activities that are appropriate for teachers but which may also be adapted for use with students. This set of activities are suggested, and leave room for users of this booklet to add activities of their own design and preference.

Suggested Evaluation Ideas: identifying a few means of assessing participants' progress toward selected objectives.

Resources: a selected and abridged list of resources that are available for use as aids and supplemental materials.

It is imperative that thorough planning occur for the development of a successful in-service program. The staff of Environmental Education Leadership Development Project found the following process helpful in planning:

1. Decide on the schedule of Workshops and the general content areas of each.
2. Circulate this tentative schedule to participants.
3. Several weeks prior to each Workshop, meet with staff members and resource persons who will be contributing to that Workshop and:
    a. formulate objectives
    b. identify activities
    c. specify resources
    d. identify evaluation procedures
    e. begin to formulate an agenda.
4. Finalize arrangements for any speakers or resource persons for the Workshop.
5. Assemble the books, pamphlets, simulations, articles, films, and other instructional resources that will be used.
6. Assemble a take-home packet of materials for teachers to add to their resource files and use in their classrooms.
7. Finalize the agenda for the Workshop and send each participant a copy. Plan mailing so that participants receive the agenda

two or three days prior to the Workshop. This also serves as a reminder. (For a long-term reminder, be sure to announce the date of the next Workshop at the close of each session.)

8. Plan refreshments and other amenities. Be sure refreshments are available as people arrive.
9. Unless participants all know each other well, prepare name tags with printing large enough to be read easily across a table. Encourage people to wear them at all sessions.
10. Make all necessary physical arrangements, such as parking for participants, physical set-up of Workshop room, necessary equipment available.
11. Establish a rapid pace for activities and presentations. Don't let discussions, questions or presentations drag. Make the Workshop lively, draw on all participants.

WORKSHOP I

Introduction to the Project; Scope of Environmental Education

Overview

In this initial Workshop, participants were provided with a comprehensive introduction to the Environmental Education Leadership Development Project. Dates were selected for subsequent workshops and their nature and content were sketched. The role of the Circuit Rider was described as well as the responsibilities of participants as they worked cooperatively in their districts with administrators, other teachers, staff members, and students. A variety of administrative matters were dealt with such as admission to the University, registration and planning, and the Circuit Rider's initial visits to districts. A pretest to determine the participants' opinion toward teaching strategies for environmental studies was administered. The scope of environmental education was defined using a portion of the Curriculum section of a draft of the State of Illinois Plan for Environmental Education (Appendix II). These curriculum themes guided content selection for subsequent workshops and were used in curriculum planning in several of the cooperating districts. A word association activity was used to draw opinions and reactions of participants regarding the role of curriculum leaders in schools. Similar activities were used to enhance participants' interactions with the Project staff and each other.

Objectives

On completion of Workshop I, participants should be able to:

1. describe the objectives of the Environmental Education Leadership Development Project and the procedures that will be utilized in attaining them.
2. describe their role in the Project and identify the role of the Circuit Rider.
3. identify the scope of environmental education in terms of the Curriculum Themes of the State of Illinois Plan for Environmental Education.
4. identify some interdisciplinary relationships that must exist in environmental education.
5. formulate an approximate description of the role of a curriculum leader in a school district.

Some Suggested Activities

1. Provide participants with a brief description of the scope of environmental education and ask groups of five participants to come to consensus on:
    a. the six most essential major science concepts that must be included;
    b. the six most essential major social science concepts that must be included;
    c. the six most essential humanities concepts that must be included.

    After ten minutes of discussion, ask each group to report to all participants. Record the concepts, look for similarities. Have participants explain why they chose concepts that others did not.

2. Present participants with an outline of the nature and scope of environmental education such as that provided in Appendix B. Ask participants to identify and describe in a few words what each theme means to them. Also ask each participant to state one idea included in the statement that had not been part of his concept of environmental education.
3. Show the film, Tragedy of the Commons. This film is organized in an interactive format; that is, at several points a question is posed to the audience and the film may be stopped for discussion.
4. Select two or three incidents relating to curriculum leadership roles of teachers from Classroom Incidents and have participants discuss these.
5. As a synectic activity have participants list words on a sheet of paper taped to the walls of the meeting room which are their synonyms for "education," "environment," and "environmental education." Using the synonyms listed in the final category, have the participants develop several sentences defining environmental education.

Suggested Evaluation Ideas

1. Ask each participating team to describe the first three actions they will take in initiating their new role in the Project.
2. Have each participant describe what the five curriculum themes mean to him.
3. Ask each participating team to write five objectives that they should try to achieve by Christmas in initiating environmental education in their school.

Resources

BOOKS

Eblen, William R. *TETE: Total Education in the Total Environment*. Yonkers, New York: Hudson River Museum, 1971.

Greenwood, Gordon E., Good, Thomas L. and Siegel, Betty L. *Problem Situations In Teaching*. New York: Harper & Row, 1971.

Holt, J. *How Children Fail*. New York: Dell Publishing, 1969.

Jersild, A.T. *When Teachers Face Themselves*. New York: Teachers College Press, 1955.

Lehman, D.C. *Role Playing and Teacher Education*. Washington, D.C.: American Institute of Biological Sciences, 1971.

Lunetta, Vincent N. and Zalewski, Leon J. *Interactive Incidents from Classrooms, Schools and Community*. Washington, D.C.: National Science Teachers Association, 1974.

Storer, John H. *The Web of Life*. New York: Harcourt, Brace & Company, 1953.

FILMS

Tragedy of the Commons color/24 minutes Biological Sciences Curriculum Study.

With Such As These 16mm The Center for Curriculum Design.

What Are We Doing to our World? Parts I and II color/50 minutes McGraw Hill Films.

PAMPHLETS

Environmental Education: Education that Cannot Wait. Washington, D.C.: Department of HEW, Office of Environmental Education, 1970.

Meyers, Charles B. *The Environmental Crisis: Inquiry into Crucial American Problems*. Englewood, New Jersey: Prentice-Hall, 1972.

WORKSHOP II

Leadership Development; Basic Ecology

Overview

The Workshop was organized into three interrelated learning centers, entitled Experimental Ecology, Ecological Concepts, and Evolutionary Concepts. Each center approached the material from a different point of view, and participants worked in the center which best suited their background and interests. The Workshop was not intended to provide answers, instead its purpose was to have participants investigate concepts and identify important questions regarding man-environment relations and environmental education. An introduction to leadership skills development was provided by a specialist in business management. He stressed the need for leaders to be able to conceptualize experience and information into issues and, ultimately, into courses of action.

Objectives

On completion of Workshop II, participants should be able to:

1. describe an ecosystem and all of its essential parts.
2. identify eight different ecosystems.
3. identify and understand the importance of biochemical cycles.
4. describe the interrelationships of the biotic and abiotic factors in an ecosystem.
5. discuss the interrelationships of producers, consumers (herbivores, omnivores, carnivores) and decomposers in an ecosystem.
6. describe the interaction of the trophic levels in a biotic pyramid.
7. identify the interrelationships that are formed between ecosystems during the process of biotic succession.
8. describe ways of incorporating ecological principles into the curriculum.
9. describe at least one major characteristic of a good leader.

Some Suggested Activities

1. Mark off and number several three-foot squares in an area that exhibits diversity of plant population. Ask each participant to examine at least three different squares and make an inventory and comparison of the plants and animals living in each. Also ask participants to try to hypothesize interrelationships of different populations in different squares.
2. Have small groups of two or three participants select one of the squares as a mini-ecosystem and (a) describe all biotic and abiotic components and (b) chart the food web within that system.
3. Assemble participants in groups of four or five and give each group a chart showing a different biogeochemical cycle. Ask each group to prepare a short presentation for delivery to other participants describing the infinite reuse of the elements included in the cycle. Be sure to include ways in which natural cycles are being disrupted as well as the consequences of disruption.
4. Ask the participants working in small groups to chart a food chain of their choosing and describe the results of a break in that chain on various consumers.
5. Have the participants examine a rotting log and discuss the interrelationships represented there.
6. Ask participants to identify specific settings in their own community or school site where basic principles of ecology can be exemplified for their students.
7. Using the participants' own community (school district) as an example, determine factors that will limit population growth. Have them identify as many factors as they can that may alter the limit.

Suggested Evaluation Ideas

1. Discuss the significance of Dr. Barry Commoner's statement that "in nature everything depends on something else."
2. Explain what ecology is.
3. Describe a typical food chain in a prairie, listing at least five links.
4. Describe the impact of construction of a subdivision on the ecology of a climax oak/hickory forest.
5. Describe the major features of the carbon (nitrogen, phosphorous) cycle.
6. Explain why it has been said that food chains act as biological amplifiers.

7. Explain what is meant by the statement "all flesh is grass."
8. Describe briefly some of the major biological problems which may be associated with the green revolution.

Resources

BOOKS

Can Man Care for the Earth? Nashville: Abingdon Press, 1971.

Commoner, Barry. The Closing Circle. New York: Knopf, 1971.

Ehrlich, Paul R., Harriman, Richard L. How to Survive: A Plan to Save Spaceship Earth. New York: Ballantine, 1971.

Graham, Frank Jr. Since Silent Spring. New York: Houghton Mifflin, 1970.

Hungerford, H. Ecology: The Circle. Chicago: Childrens Press, 1971.

Krutch, Joseph W. The Measure of Man. New York: Grosset and Dunlap, 1954.

Leopold, Aldo. A Sand County Almanac. New York: Ballantine Books, 1966.

Turk, A., Turk, J., Wittes, J. Ecology, Pollution, Environment. Philadelphia: W.B. Saunders Company.

Wagner, Richard H. Environment and Man. New York: W.W. Norton & Company, 1971.

FILMS

All the Difference. color/20 minutes. Modern Talking Picture Service.

America the Beautiful. color/3 minutes. General Electric Educational Films.

Ark. color/20 minutes Arthur Barr Productions.

Conservation and Balance in Nature. color/18 minutes. International Films Bureau, Inc.

Multiply and Subdue the Earth. color/67 minutes. Indiana University.

Myths and Parallels. black and white/28 minutes. Silvermine Films.

Our Vanishing Wilderness: The Prairie Killers. color/30 minutes. Indiana University.

Our Vanishing Wilderness: Will the Gator Glades Survive? color/30 minutes Indiana University.

A Strand Breaks. color/15 minutes. Encyclopedia Britannica.

The Strand Grows. color/15 minutes. Encyclopedia Britannica.

Tragedy of the Commons. color/23 minutes. Holt, Rinehart & Winston, Inc.

Water and Life. color/15 minutes. Film Association.

PAMPHLETS AND JOURNALS

Ecology Books A, B, & C. Columbus, Ohio: American Education Publications.

McInnis, Noel F. Exploring Spaceship Earth. Evanston, Illinois: The Center for Curriculum Design.

McInnis, Noel R. "Getting with Spaceship Earth", Perspectives. Winter, 1971, Vol. 2, no. 3.

Stitt, Thomas R. An Environmental Glossary for Environmental Educators. 1973.

Wisconsin Department of Public Instruction. Ecology & Human Values - A Course of Study, Bulletin No. 3171.

WORKSHOP III

Human Ecology; Environmental Planning

Overview

This Workshop was concerned with the present rate of population growth, unprecedented in history, which has reached the point where future alternatives for population change must be clearly understood in order to insure not only existence but quality of life on this planet. The Workshop attempted to look at some problems which increased human population growth has created in terms of personal, social and ecological relationships. Understanding environmental interaction was stressed as a major factor in environmental planning. A variety of introductory activities were used to help people become aware of their environment. The Workshop was designed to show that planning takes into account the interdependence of all living organisms and how these interrelationships affect people's continued quality existence.

Objectives

On completion of Workshop III, participants should be able to:

1. define and understand the following terms and their relationship to each other; fertility, mortality, immigration, emmigration, growth rate, exponential growth and doubling time.
2. define what constitutes a demographic trend for both human and non-human species.
3. identify and discuss recent changes in the United States population size, composition, and distribution.
4. identify and discuss recent population changes in the world community.
5. specify the effect of increased human population on other living organisms.
6. explain the need for balance between population growth and economic development.
7. describe ways in which environment influences quality of life.
8. examine solutions to the problems of increasing population; discuss issues related to possible solutions such as:
    a. housing
    b. employment

c. education

d. food

e. loss of open space

f. resource depletion

g. environmental pollution

h. urban sprawl

i. transportation

Some Suggested Activities

1. Provide each participant with a large sheet of paper and ask them to draw a map of the community in which they live. Post the pictures on the walls and discuss what these pictures tell us about our views of our community. (For example, many maps emphasize roads and other constructed features and minimize nature features such as parks and rivers. From this one might infer that individuals are more familiar with, and perhaps value, the former more than the latter.)

2. Have participants work in pairs and take turns guiding each other on a "blindfold walk." Emphasize identification of objects using non-visual stimuli. Allow ten to fifteen minutes for each person to experience the environment while blindfolded. Then have a debriefing session where individuals relate their experiences. Follow this with a discussion of the significance of the experience and its possible impact on other teachers and students.

3. Discuss the following concepts that relate to human ecology: fertility, mortality, immigration, emmigration, expontial growth, doubling time, demographic trends.

4. Using national population data, discuss changes and trends in size, composition, and distribution of population in the United States. Data may be obtained from the World Almanac, an encyclopedia, or other sources. After examining data discuss the following:

    a. What factors have contributed to these changes?

    b. What are the environmental consequences of these population changes?

    c. What are the social consequences?

    d. How have these changes affected the quality of human life?

5. Repeat the above using local population data and/or world population data.

6. If available, have participants work through one or more of the following computer simulations: POP, USPOP, HARDY which are available from the Digital Equipment Corporation.

7. Ask participants to identify in as many ways as they can how human existence has changed in the last 250 years. Make a similar list of ways human existence hasn't changed over the same period. Then ask participants to state what meanings about people and their environment these two lists convey. Finally, ask participants to indicate for each entry on the first list how the change has influenced quality of life.

8. After reading Jonathon Swift's classical satire A Modest Proposal (1729) about overpopulation, poverty and cannibalism, allow discussion and reaction.

9. Encourage participants to visit a meeting of their local Planning and/or Zoning Commission to determine whether environmental considerations are a part of the planning process.

10. Have participants investigate the differing environmental impacts which result from building an apartment complex rather than single-family dwelling.

Suggested Evaluation Ideas

1. Define crude birth rate, crude death rate, fertility rate, rate of natural increase and doubling time. Explain how these statistics are related to one another.

2. Explain why a knowledge of the age structure of a population is essential to making projections of its future growth or decline.

3. Present a two-minute talk on the concept of optimum population.

4. Identify some of the prominent deficiences in American governmental structure which help to prevent action to deal with the population-resource-environment crisis.

Resources

BOOKS

Can Man Care for the Earth? Nashville: Abingdon Press, 1971.

Ehrlich, Paul R., Ehrlich, Anne H. Population, Resources, Environment: Issues in Human Ecology. San Francisco: W.H. Freeman & Co., 1970.

Reich, Charles. The Greening of America. New York: Bantam Books, 1970.

FILMS

Boomsville. color/11 minutes. Learning Corporation of America.

The Concession. color/17 minutes. Independent Film Corporation.

The House of Man, Part II - Our Crowded Environment. color/11 minutes. Encyclopedia Britannica.

A Matter of Time. color/28 minutes. Conservation Foundation.

The Persistent Seed. color/14 minutes. National Film Board of Canada.

Pollution is a Matter of Choice. color/53 minutes. NBC Education Enterprises.

The Pond and the City. color/16 minutes. Encyclopedia Britannica.

Population Ecology. color/19 minutes. McGraw-Hill.

Prudhoe Bay - Or Bust! color/30 minutes. Indiana University.

Standing Room Only. color/35 minutes. McGraw-Hill.

Tragedy of the Commons. color/23 minutes. Holt, Rinehart & Winston.

Urbanissimo. color/6 minutes. McGraw-Hill.

Urban Sprawl vs. Planned Growth. color/22 minutes. Stuart Finley, Inc.

PAMPHLETS AND JOURNALS

Don't Leave it all to the Experts - The Citizen's role in Environmental Decision Making. Washington, D.C.: U.S. Environmental Protection Agency.

Managing Our Environment. Agriculture Information Bulletin. U.S. Department of Agriculture, No. 351.

McInnis, Noel. "Gestalt Ecology: How do we create Our Space?", *Social Education*. March, 1972.

Passaneau, Joseph. "The Efficient City", *Forum*. November, 1973.

Planning for Growth in Chicago's far South Suburbs Draft III, College of Environmental and Applied Sciences. Park Forest South, Illinois: Governors State University.

Protecting Our Resources - The Story of Conservation in the Petroleum Industry. Chicago, Illinois: American Oil Company.

WORKSHOP IV

Planning Environmental Education; Simulation and Games

Overview

This Workshop offered the participants an opportunity to examine various formats that have been used to implement environmental education programs in high schools. Input from the Illinois Office of Education, Division of Environmental Education, was presented concerning the status of the proposed State of Illinois Plan for Environmental Education. Participants were able to exchange ideas and discuss the problems of developing and implementing environmental education into a school's education program.

The second portion of the Workshop exposed the participants to many of the new institutional materials for environmental education, and to several simulations and games that are available. Time was allowed for participants to get involved in the actual play of the games.

Objectives

On completion of Workshop IV, participants should be able to:

1. describe the philosophy, rationale and organization of ten books, simulations or other available environmental education resources that they were not familiar with prior to the workshop.
2. identify the major agencies in the state and region that are responsible for environmental education and describe current actions and available services.
3. identify natural and human resources that are available for environmental education within local communities and indicate how these may be used in the local school environmental education programs.
4. describe the differences between games and simulations and give several examples of each.
5. identify at least six games and simulations that are directed toward environmental education and describe the content, objectives, procedures, and predicted learning outcomes of each.

Some Suggested Activities

1. Involve the participants in idea sharing sessions with panels which might include such people as a representative from the State Office of Environmental Education, a coordinator of environmental

education from a national environmental organization, a teacher currently involved in a successful environmental program, and a university professor in environmental education.

2. Have a brainstorming session to develop a list of community resources for environmental education. Make separate lists for human resources (experts and action groups that can help), study areas (parks, urban renewal areas, ponds) and sources of information and materials about the local area. Institute a plan for utilizing these resources.

3. Have a brainstorming session to identify as many ways as possible that students receive environmental education outside of school. Some obvious ones are T.V. programs and the "Pitch In" Project. After each entry, try to idnetify (a) the organizations that are responsible for this effort, (b) the objectives that are apparent, (c) the impact which the effort is having on students, and (d) how schools should build on this out-of-school influence.

4. Provide displays showing new materials for browsing by the participants. Give participants a form such as the one that follows so that they can record information about the material.

Title, Author, Publisher	Notes--include data on philosophy, rationale, subject matter, level, organization....

5. Allow the participants to experience first hand the interactions that can take place in a simulation game. Provide several games such as Planet Management, The Redwood Controversy, Dirty Air, Dirty Water, The Dead River, W.A.L.R.U.S. and allow the participants sufficient time to participate in two simulations.

6. Have participants describe the game or simulation which they have played to other participants who were involved with another game.

Suggested Evaluation Ideas

1. The participants should choose one simulation or game and identify its explicit and implicit instructional objectives, its contents, procedures, and test its effectiveness as a teaching instrument.

2. Each participant should inventory their respective communities in order to identify key supportive people, citizen action groups, existing programs, and unique natural resources that help to reinforce classroom information. This inventory could be presented to others in the group as well as serve as an example of the participant's achievement of the objectives.

Resources

BOOKS

Terry, Mark. Teaching for Survival. New York: Ballantine, 1971.

FILMS

Children and Trees. color/12 minutes. Harpers Ferry Historical Association.

Earthbound. color/20 minutes. William Eddy, Harvard, Massachusetts.

Environmental Awareness. color/5 minutes. Conservation Foundation.

Environmental Enrichment - What You Can Do About It. color/15 minutes. Central Educational Films.

The Sense of Wonder. color/53 minutes Central Educational Films.

PAMPHLETS AND JOURNALS

Cook, R. and O'Hearn, G. "Formation of Environmental Values: A Social Awareness", Process for a Quality Environment. Green Bay, Wisconsin: University of Wisconsin.

"Ecology Kits", Consumer Reports. June 1973, p. 422-424.

Environmental Education Bibliography, AIDS Grades 7-9. Massachusetts: U.S. Office of Education.

Environmental Education for Everyone - Bibliography of Curriculum Materials for Environmental Studies. Washington, D.C.: National Education Association, 1970.

GM - The Environment. Warren, Michigan: General Motors Corporation.

Protecting Our Resources - The Story of Conservation in the Petroleum Industry. Chicago, Illinois: American Oil Company.

Roth, R. "Fundamental Concepts for Environmental Management Education (K-12)", *Journal of Environmental Education*.

Scariano, A. and Schmitt. L. "Environmental Problems, Curriculum Documents", Olympia Fields: Rich Township High School, District 227.

Stitt, Thomas R. *An Environmental Glossary for Environmental Educators*, 1973.

The Third Wave. Washington, D.C.: U.S. Department of the Interior, 1967.

GAMES (See Appendix IV)

Rasmussen, Frederick A. *Redwood Controversy*. Boston: Houghton Mifflin, 1971.

WORKSHOP V

Environmental Education - A Process Approach

Overview

This Workshop was conducted by John Pager, U.S. Forest Service, using selected activities from the Forest Service Teacher Education Program, Environmental Education - A Process Approach.* Participants were involved in a rapid fire series of activities that included observation and classification of several varieties of trees, values-clarification exercises, problem-solving activities, land-use simulation, a simulation of political decision making, and methods of obtaining high quality individual and group participation in meetings. The overall emphasis was on developing process skills that can be transferred to a wide range of teaching and community action situations.

Objectives

On completion of Workshop V, participants should be able to:

1. describe the philosophy of a process approach to environmental education and give examples of activities which exemplify this philosophy.
2. demonstrate questioning and discussion leadership skills for maximizing individual and group participation at meetings and training sessions.
3. describe at least three values-clarification techniques and explain how these can be used in environmental education.
4. use or adapt Environmental Education Process Approach activities in planning lessons for their own classroom and curricula.

Some Suggested Activities

1. Have participants assemble into teams of five or six. Give each group twigs from five different species of evergreen such as arborvitae, taxus, scotch pine, white pine and balsam. Ask participants to describe each. Then, ask them to classify the twigs into two groups based on similar characteristics. Have each team describe to others the classification criteria. Finally, have participants prepare an identification key based on observable characteristics.

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*This is an excellent resource and is available to people who participate in the U.S. Forest Service Environmental Education: A Process Approach Workshops. Information on these can be obtained from your Regional Office of U.S. Forest Service.

2. Present the following problem situation to participants:

> You have been appointed to select a group of ten people to colonize a new planet. The following have volunteered from which you can select only ten:
>
> an agronomist
> an electrical engineer
> a twenty-year old actress
> a married couple (wife is 4 months pregnant)
> a black physician
> an economist
> a mechanic
> a Catholic priest
> a geologist
> a nurse
> an elementary school teacher
> a civil engineer
> an attorney
> a welder
> a tool maker
> a retired pro-football player
>
> The married couple will only go if both are selected; one is a hair stylist and the other is a bacteriologist.

Ask participants working in groups of five or six, to:

a. come to consensus on the people they would send to colonize the planet.

b. state the rationale for selecting and rejecting each of the volunteers.

c. identify values positions which influenced their choices.

Have groups report their selections to the other groups along with their rationale. Discuss any variations among lists that may occur.

3. Present the following problem situation to the participants:

> You have been selected as a Peace Corps worker to go to New Guinea for two years as a teacher working in one of the most primative tribes on Earth. You are limited to 100 lbs. of luggage. You will be visited by a Peace Corps supervisor four times a year who will bring you a few additional supplies and necessities. What will you take with you?

Ask participants working in groups of five or six, to:

a. come to consensus on what should make up the 100 lbs. limit.

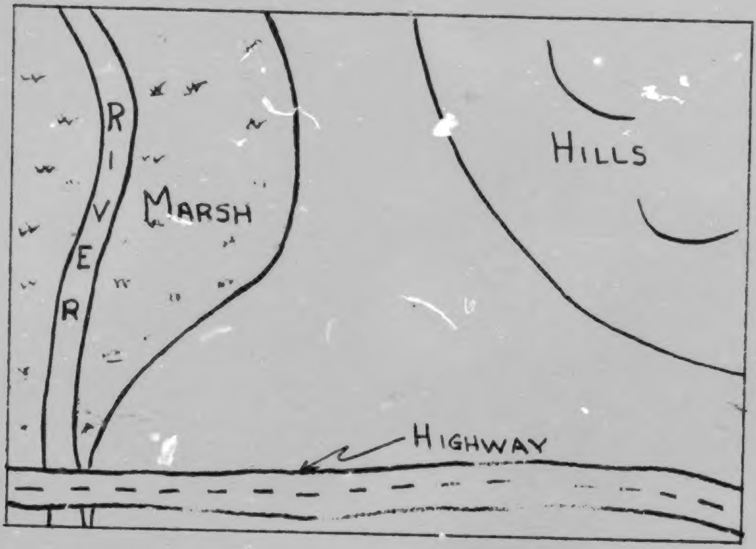
b. state the rationale for selecting each item.

c. identify values positions which influenced choices.

Have groups share the results of their discussions.

4. A land-use planning simulation. Present the following problem situation to the participants:

> A small city has been given one square mile of land on its outskirts. It is bounded on one side by a river, and on another by a major roadway. About 100 acres is a marsh, 200 acres are quite hilly and the remainder is quite level and well drained.



> The City Council is attempting to find the most beneficial use for the land; special groups with differing interests are in competition with each other to have their plan adopted.

Organize participants into four or five groups and assign groups one of the following land use plans:

- an industrial park
- a housing development
- a recreational area
- a human services center (schools, hospital, city hall, etc.)
- a sewage treatment facility and land fill
- (other uses may be proposed by the group)

Have them formulate a land use proposal for their assigned topic. Visual displays may be prepared using newsprint and magic markers.

Each group should then elect one of their members to constitute the City Council which should meet privately for a few minutes to establish the ground rules for presentation of land-use plans. Following their meeting, the City Council will hear proposals and then either:

a. select one for implementation, or

b. send some or all of the proposals back for more work.

In any case, the rationale for the City Council's action must be presented to the "public." After the simulation participants should analyze the processes used and transfer the technique and process to a local land management issue in the participant's home community.

Suggested Evaluation Ideas

1. Prepare a set of lesson plans for three environmental topics relevant to the participant.
2. Ask participants to summarize strategies necessary for maximizing individual and group participation at meetings.
3. Ask participants to formulate an original values-clarification task for students which they teach.

Resources

BOOKS

Environmental Education for Everyone, Bibliography of Curriculum Materials for Environmental Studies. Washington, D.C.: National Education Association, March, 1970.

Hammerman, D., Hammerman, W. Teaching in the Outdoors. Minneapolis, Minnesota: Burgess Publishing Co., 1964.

Massachusetts Audobon Society. Environmental Education Bibliography, AIDS Grades 7-9. Washington, D.C.: U.S. Office of Education.

U.S. Forest Service. Environmental Education Planner for Workshops. Portland, Oregon: U.S. Department of Agriculture.

FILMS

Children and Trees. color/12 minutes. Harpers Ferry Historical Association.

Discovery. color/21 minutes. Film Services, Tennessee Valley Authority.

The Environmental School. color/7 minutes. U.S. Department of Agriculture, Office of Information.

To Live on Earth. color/15 minutes. Northern Illinois University.

PAMPHLETS AND JOURNALS

Bennett, D.B. "The Development of a Model to Evaluate the Attitudinal and Behavioral Goals of K-12 Environmental Education". Ph.D. dissertation, 1972.

Sears, James D. "An Environmental and Ecological Inventory", The Science Teacher. February, 1972.

Stapp, W.B. "Environmental Encounters", Journal of Environmental Education. 1970.

WORKSHOP VI

Energy

Overview

This Workshop was designed to make the participants aware of the magnitude of the energy crisis and to provide a framework within which the participants could plan future use and management of energy supplies. After initial introductory activities, the participants utilized the University library to gather statistical data on productivity, energy utilization, national population growth, and consumption figures. Time was also spent examining the relationships between the various types of power production and population in order to calculate the overall effects on the environment. The Workshop suggested curtailing the quantity of energy usage in order to preserve quality of energy usage.

Objectives

On completion of Workshop VI, participants should be able to:

1. describe new and alternative sources of energy.
2. investigate local, regional, and international political factors contributing to the energy crisis.
3. identify political and economic problems associated with the energy crisis.
4. demonstrate ways in which changes in life styles, attitudes, values, beliefs, and behavior may help reduce the energy crisis.
5. convey energy conservation methods to other members of their community.
6. itemize the energy costs of the production of a retail product.
7. understand the exponential rate increases of energy resource usage.

Some Suggested Activities

1. Present participants the following data on per capita consumption in several countries:

Country	Per Capita Consumption (Barrels per year - 1960)
USA	45
Canada	30
United Kingdom	26
Belgium Luxembourg	22
Germany	18
France	13
Japan	7
Italy	7
Spain	4
Mexico	3
India	1

Involve participants in a brainstorming session on ways that per capita consumption of energy could be reduced in the USA. Follow this with a discussion on what the consequences of implementing these suggestions would be:

2. Present participants the following data on U.S. consumption of refined petroleum and U.S. refining capabilities.

Year	Consumption	Refining Capability
1972	16×10^6 Bbl./day	16×10^6 Bbl./day
1975	18×10^6 Bbl./day	16×10^6 Bbl./day
1980	22×10^6 Bbl./day	16×10^6 Bbl./day
1985	27×10^6 Bbl./day	16×10^6 Bbl./day

Ask participants to identify the causes and predict consequences of these trends.

3. Present participants with data on different uses of energy in U.S.

Uses of the Three Major Fossil Fuels (1969)

Petroleum	Automobiles	27.7%
	Other transportation	25.2
	Space heating	20.0
	Process heat	10.9
	Petrochemicals	10.5
	Electric energy generation	5.7
		100.0%
Natural Gas	Process heat	40.2%
	Space heat	22.0
	Electric energy generation	17.1
	Water heating cooking	10.1
	Petrochemicals	2.6
	Losses	8.0
		100.0%

Coal	Electric energy generation	56.0%
	Process heat	21.7
	Iron and steel production	17.2
	Space heat	3.9
	Petrochemicals	1.2
		100.0%

Then examine the following:

a. How is the energy crisis affected by driving 55 mph rather than 70 mph? (Many cars go 20% further on a gallon of gas at 55 mph.) How much oil would be saved?

b. How will the energy crisis be affected if we all drove sub-compact cars (average 30 mpg) as opposed to large cars (average 15 mpg)? How much oil would be saved?

c. What reduction of the total energy consumption would occur if Americans kept their buildings and homes five degrees cooler in winter (about 68° F) and five degrees warmer in summer (about 78° F) through maintaining a constant 73° F year round? (Generally this results in about a 15% reduction in heating and cooling costs.)

d. What would be the reduction of energy consumption by not using a dishwasher? By taking a shower rather than a bath?

e. Have the participants identify other ways of saving energy and determine what the effects would be on the total energy consumption of the nation if everyone followed these energy saving methods.

4. Have each participant select any manufactured product they wish and then ask them to utilize the library as a resource in attempting to determine the energy budget of the manufacturer of that product.

5. Give participants an opportunity to browse through selected energy education materials. A few are listed in the pages that follow. Many more are being produced each month.

6. List ten adjustments that Americans could make that would have considerable impact on reducing the rate of fossil fuel consumption. What are some of the personal, social, economic, and environmental consequences of each of these adjustments?

	Adjustment	Consequences	Ease	Impact
A.				
B.				
C.				
D.				

a. In the column at the right headed EASE, rank the ten adjustments from the easiest to live with to the hardest to live with.

b. In the column at the right headed IMPACT, rank the ten adjustments from the least impact on energy saving to the greatest.

c. On the reverse side, give your summary interpretation of these data.

7. Have the participants plan meals for several days that would require minimal energy in preparation.
8. Invite a resource person from an energy corporation (gas, oil, or electrical company) to discuss that industry's policies on environmental programs and the energy crisis.
9. Describe the advantages and disadvantages associated with producing electricity from fossil fuels, solar, nuclear, and hydroelectric sources.

Suggested Evaluation Ideas

1. Name at least six sources of energy, and discuss the amount available and distribution of each.
2. Distinguish between renewable and non-renewable resources and list five examples of each.
3. Explain how the use of energy is related to the theoretical carrying capacity of the earth.
4. Explain in what ways pollution with radioactive substances is different from pollution with non-radioactive substances.
5. Describe the fundamental ways that the passage of energy through ecosystems differs from the passage of materials.

Resources

BOOKS

Dasman, Raymond. Environmental Conservation. San Francisco: Wiley, 1968.

Ehrlich, Paul R., and Ehrlich, Anne H. Population, Resources, Environment: Issues in Human Ecology. San Francisco: W.H. Freeman and Co., 1970.

Novick, Sheldon. The Careless Atom. New York: Houghton-Mifflin, 1969.

FILMS

The Atom and the Environment. color/22 minutes. U.S. Atomic Energy Commission.

Conquering the Sea. color/30 minutes. Modern Talking Picture Service, Inc.

Energy on the Move. color/28 minutes. Modern Talking Picture Service, Inc.

Fusion Research color/22 minutes U.S. Atomic Energy Commission.

Instant Energy on Demand. color/29 minutes. Modern Talking Picture Service, Inc.

Invisible Power of Coal. color/28 minutes Modern Talking Picture Service, Inc.

The Third Pollution. color/30 minutes. National Audio Visual Center.

Underground Story of Natural Gas. color/23 minutes. Modern Talking Picture Service, Inc.

PAMPHLETS

The Environment and What to do About it. Washington, D.C.: Atomic Energy Commission, May, 1969.

Fri, Robert W. "A Statement to the Public on Clean Air and the Automobile", Washington, D.C.: U.S. Environmental Protection Agency.

Gonzalez, Richard J. *Petroleum Today*. Philadelphia, Pennsylvania

Lyerly, R. and Mitchell, W. *Nuclear Power Plants*. Washington, D.C.: Atomic Energy Commission.

"Protecting Our Resources: The Story of Conservation in the Petroleum Industry", Chicago, Illinois: American Oil Company.

Risser, Hubert E. "The U.S. Energy Dilemma - The Gap Between Today's Requirements and Tomorrow's Potential", Springfield: Illinois State Geological Survey.

Sachs, Robert G. "Energy Options". Washington, D.C.: Enrico Fermi Institute.

"Toward a National Energy Policy". New York: Mobil Oil Corporation.

WORKSHOP VII

Air and Water Pollution

Overview

This Workshop allowed the participants to focus on air and water quality problems. Air pollution sources such as: space heating, power generation, waste disposal, industrial processing, and transportation were examined including the volume of pollutants emitted from each source. The effects of air pollution on health, economic costs and community aesthetics were considered. Also, the technologies used in monitoring air quality in a large metropolitan area were displayed and explained. Emphasis was placed on the interrelationships of local, regional and national air pollution problems plus the realization of the continuing interrelationship between air pollution and water pollution.

The water pollution segment of the workshop exposed the participants to the many types of water pollutants. It also offered them an explanation of the basic water quality tests that can be conducted to measure water quality.

Objectives

On completion of Workshop VII, participants should be able to:

1. identify natural and man-made pollutants which contribute most to air pollution.
2. describe air pollution as an international, national and environmental problem.
3. identify major sources of air pollution within national and regional areas and local communities, and the consequences of not controlling them.
4. describe the various types of air pollution and their effects on health and environment.
5. describe the economic costs involved in controlling or abating air pollution.
6. describe various air pollution control techniques.
7. detail the hydrologic cycle and state its importance.
8. describe the physical and chemical properties of water.
9. distinguish between the various types of water pollution.
10. describe the methods of water and waste water treatment.

11. appraise the quality of a sample of water based on the following tests: pH, total phosphates, biological oxygen demand, dissolved oxygen, and fecal coliform.

12. evaluate his own attitude, behavior and individual responsibility toward water consumption and the need to cooperate with water conservation practices.

13. investigate regulations and legislation controlling water conservation and planning on the international, national, state and local levels.

14. develop a blueprint for improving his community's air and water quality.

Some Suggested Activities

1. Contact the Regional Office of the U.S. Environmental Protection Agency and ask them to provide some or all of the following for use in workshops:

    (a) pamphlets or other printed materials

    (b) films

    (c) a speaker who can describe local air and water problems along with current and needed actions to improve air and water quality.

    Check also with State, County, and Municipal agencies responsible for bringing about improvement of air and water quality.

    N.B. Do this several weeks in advance of the Workshop as most agencies have limited staff and resources for this educational work.

2. Have participants learn techniques of testing for water quality using some of the simpler, low cost kits such as:

    pH kits available in most aquarium supply stores

    dissolved oxygen kits

    Directions are enclosed and participants will be able to follow them with little or no help.

    Discuss how these kits might be used as part of the school curriculum.

3. Demonstrate the use of a high volume air sample and what information it provides. (Construct one out of a vacuum cleaner if the commercial type is not available.)

4. Have participants prepare and use a variety of simple air quality sampling devices such as:

    Ringleman chart

    vaseline covered microscope slide

    white paper "dust collector"

Demonstrate how each can be used with students in gathering data or making interpretations.

5. Visit a water purification plant and/or a sewage treatment plant and learn how water quality is controlled in these plants.
6. Schematically depict the hydrologic cycle.
7. Encourage participants to monitor the news media: newspapers, periodicals, radio and television for pertinent items.
8. Allow the participants to run the following water quality determinations: phosphates, nitrates, and biological oxygen demand.
9. Discuss the ways in which man may be altering the climate of the earth.
10. Describe at least six harmful effects of air pollution on humans.
11. Discuss why rivers are used as a method of sewage disposal. If legislation were enacted prohibiting sewage in rivers, disposal plants would be a necessity. Who should be responsible for building these plants? Who should pay for them? Who should be responsible for inspection and control? Prepare a press release (as if you were the governor of a state about to place such requirements) justifying the new law on sewage disposal.

Suggested Evaluation Ideas

1. Have participants make up a list of the major pollutants of air and water, the most common sources of each, the effects of each, and the mechanisms and costs of remedying each.
2. Have each participant prepare a set of objectives for teaching students about air and water pollution. Have them identify activities and evaluation items to go along with each objective.

Resources

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Ark. cclor/20 minutes. Arthur Barr Productions.

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The Economics of Clean Water: Summary. Washington, D.C.: U.S. Environmental Protection Agency, 1972.

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Water and its Misuse; Curriculum Guide Senior High Level, Title III, *ESEA*. Environmental Education Project, 1970.

WORKSHOP VIII

Phenology and Man's Relation to the Environment

Overview

This Workshop was designed to make participants aware of phenology and how man can use this knowledge to better understand his environment. The participants went on a field trip into a wooded area to examine many of the initial natural signs that mark the beginning of spring. Techniques in monitoring soil temperature and soil moisture were demonstrated with an explanation of how the participants could relate the importance of these measurements to plant growth. Participants also observed and learned to identify trees in their winter growth stage. The outdoor activities offered the participants some stimulus to begin considering the responsibilities of societies and individuals toward stewardship of the earth's resources. The latter portion of the Workshop allowed for interaction of thoughts concerning man's use of the environment now and how he might leave it for future generations.

Objectives

On completion of Workshop VIII, participants should be able to:

1. measure soil temperature and moisture and identify ranges of these parameters that result in maximum plant growth.
2. identify ten species of trees using characteristics other than leaf shape.
3. identify five species of plants that emerge in early spring.
4. itemize their own values and distinguish between those of substantial worth and those of transient worth.
5. compare and contrast man's present behavioral patterns with those of the past, especially in relation to environmental impact.
6. demonstrate ways in which people's behaviors are influenced by their values and their intellectual and physical resources.
7. describe ways that economic, social and political constraints influence our behavior.
8. recognize evolutionary patterns of human behavior and value systems and their implications for future patterns.

9. describe current values and consequent behaviors that are incompatible with maintenance of either a high quality environment or high quality of life.

Some Suggested Activities

1. Demonstrate a variety of techniques for measuring soil moisture and soil temperature. Be sure to include at least one procedure that requires only simple equipment.
2. Conduct a short field trip into a natural area at a time prior to the emergence of leaves. Help participants develop skills of identification of tree species using characteristics other than leaf shape. Also call attention to herbaceous species that emerge in early spring.
3. Have participants make measurements of soil temperature and moisture in a variety of micro-environments in a wooded area, and determine if any relationship exists between plant growth and its parameters. (This task could be reported at several times during the year in the same location to acquire some very useful teaching data.)
4. While on the field trip, ask each participant to make a list of evidence of behaviors that are detrimental to environmental quality and quality of life. Also ask participants to keep another list of evidence of beneficial behavior. After the trip, tabulate these lists and examine the consequences of each and infer values positions from the behavior.
5. With the aid of participants, identify four or five local environmental concerns. These might include building in an especially attractive natural area, construction of a highway, a landfill area, draining a marsh, abandonment or renewal of an inner-city area, or any other issues of current importance. Have groups of participants identify the conflicting sides in the issue, identify the immediate and long-term consequences that would occur if either of the sides were to have their way, and identify the values that appear to be influencing adherents to each side.
6. Have small groups of participants prepare for and engage in a debate on topics such as:
   a. Americans should stop treating land as a commodity to be bought and sold and start treating it as a resource over which we have only temporary stewardship.
   b. Current values and behavior are incompatible with a high quality of life.
   c. Changes in values and attitudes in recent years will result in improved environmental quality in years to come.

   d. We can save the environemnt only by better and more extensive use of technology.

   Observers should analyze the values position in each of the arguments presented in the debates.

7. Instruct the participants to go outside and find natural materials which they can use to create a piece of art. Suggest that the art work convey a theme such as the beauty of nature, the rights of endangered species, or feelings of awe.
8. Suggest that each participant find their community's newest housing development, commercial shopping center, or industrial development. Learn who owns the property and write to the owner asking what plans he has for protecting the environment within and around his property.
9. Divide the participants up into teams of four and have them encounter various environmental problems. Ask the teams to pose solutions to the problems and at the same time, examine how the proposed solutions conflict with their own values and attitudes.

Suggested Evaluation Ideas

1. Label leafless twigs of ten species with letters A-J and pass them among the group and have them write the names of the species on a paper.
2. Ask participants to describe at least one technique for measuring soil moisture and temperature.
3 Ask participants to evaluate a statement such as "It's not going to be the end of the world if grizzly bears do become extinct." Evaluation should be from the following points of view:
   a. ecological principles that are involved.
   b. values that are involved.

Resources

BOOKS

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WORKSHOP IX

Economics, Future Environments and Lifestyles

Overview

This Workshop posed two basic questions:

1. Do we really want to pay the cost of maintaining a good environment?
2. Taking into account ecological principles, engineering capabilities, aesthetic reality, and economic resources, what is the best way to pay for a good environment?

An economist introduced basic economic principles and led the participants in a discussion of inherent flaws in an economic system that fails to recognize the hidden costs of producing a product, the effects of altered growth rates in population and gross national product on American life, and the environmental impact of foreign economic and social systems. The relationship between economics and environmental improvements was closely debated. Participants evaluated existing lifestyles and their effects on the environment. Then they projected the effects future lifestyles might have on new environmental situations.

Objectives

On completion of Workshop IX, participants should be able to:

1. describe relationships that exist between economics and environment.
2. identify conflicts between public welfare and private interests, and interpret these in terms of economic, ecological, and humanistic terms.
3. identify ten ways of improving environment and quality of life, and describe the economic consequences of each.
4. evaluate the effect of monetary incentives and penalties for stabilizing populations and instituting the use of pollution abatement methods.
5. describe the impact of various lifestyles on environment and economics.
6. describe relationships which exist among exponential population growth, changes in lifestyle, resource consumption, and the degradation of the environment.
7. assess personal values and formulate a tentative definition of quality of life.

Some Suggested Activities

1. With the help of an economist, prepare solutions to selected environmental problems and then identify the immediate and long range consequences of each solution. Include economic, social, and environmental consequences in the analyses.
2. Allow the participants to brainstorm ways of making pollution a direct cost of production or consumption. This activity supports the economic fact that if costs of pollution were paid for by the creator, he would be discouraged from polluting.
3. Have participants identify as many ways as possible that controlling pollution and improving environment could be made sound economically; i.e., more profitable than discarding wastes into lakes, rivers, the atmosphere and dumps.
4. Ask participants working in groups of four or five to identify five actions they could take within the next month that would improve the quality of their own lives. After each, have them write down a list of the consequences of their actions.
5. Have participants brainstorm to develop a list of criteria for assessing quality of life. After a list is developed, categorize the criteria as very important, moderately important, and of minimal importance.
6. Organize the participants into small groups. Ask each group to identify an alternative to our contemporary lifestyle and examine the immediate and long range consequences of generating that lifestyle on our economy, the environment, consumption of resources, and the quality of life.

Suggested Evaluation Ideas

1. Ask participants to evaluate the statement, "Some economists propose using Gross National Product as a way of measuring the quality of life."
2. Have participants develop lesson plans for teaching students about the interrelationship of economics, environment, and the quality of life.
3. List ten ways that controlling pollution has detrimental economic effects.
4. Ask participants how they might:
    a. adjust their lifestyles so they consume fewer resources and have less negative impact on the environment.
    b. maintain or improve the quality of their life.

Resources

BOOKS

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WORKSHOP X

Agencies and Laws for Environmental Improvement

Overview

Because of the dynamics of the interactions of people and their environment, the environmental problems of our nation are often the problems of other nations. In this Workshop, the participants were given the opportunity to learn about international cooperation which is beginning to develop in environmental education. The United Nations efforts in formulating an international environmental education agency were outlined and explained. Participants were also given a description of the status of environmental education in other parts of the world.

During the second portion of the Workshop, a lobbyist who worked in the Illinois General Assembly explained how the Illinois Environmental Protection Act became a law. The participants learned how laws can be instruments to effect and/or impede environmental change. They also had the opportunity to examine how social, economic, and environmental concerns influence the formulation and enforcement of legislation.

Objectives

On completing Workshop X, participants should be able to:

1. describe the process by which an idea about environmental improvement becomes a law, and identify the factors and interests which influence the final legislative outcome.
2. identify local, regional, state, and federal legislation which offers environmental protection.
3. identify local, regional, state, and federal agencies and institutions dealing with environmental protection.
4. assist concerned citizenry in utilizing current legislation in the environmental protection process.
5. develop and participate in a realistic environmental problem situation.
6. describe the nature and extent of environmental education in countries other than the United States.
7. identify factors which impede a world-wide environmental education movement.

Some Suggested Activities

1. Invite a legislative lobbyist from an environmental group or a legislator who has sponsored environmental legislation to describe the process by which one or more laws regulating environmental quality were prepared, introduced, modified, and passed. Be sure to have the participants explore who the opponents and proponents of the bill were, what compromises were made, how opponents altered implementation procedures and definitions to weaken the law, and other factors which influenced the final outcome of legislation.
2. Have the participants identify a local or state-wide environmental problem, and determine the procedures and background information that would be necessary to bring this matter to the attention of the appropriate legislative group.
3. Have participants examine the voting records of their legislators to discover how they have voted on environmental issues. Use the League of Conservation Voters charts which are updated annually.
4. Organize and debate among the participants on the need to relax pollution abatement laws during the energy crisis.
5. Allow the participants to examine an Environmental Impact Statement and judge its completeness and effectiveness.
6. Obtain information on environmental education in other countries and present it to participants. Have a discussion on ideas that can be gained from learning about environmental education in other countries.

Suggested Evaluation Ideas

1. Describe some ways in which our legal system might be used to fight pollution and overpopulation.
2. Leaders in many walks of life are emphasizing quality of life. Identify five or six actions that must occur if quality of life is to be maintained in terms of national priorities.
3. Identify key features in the development of environmental control legislation and needed future legislation.

Resources

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FILMS

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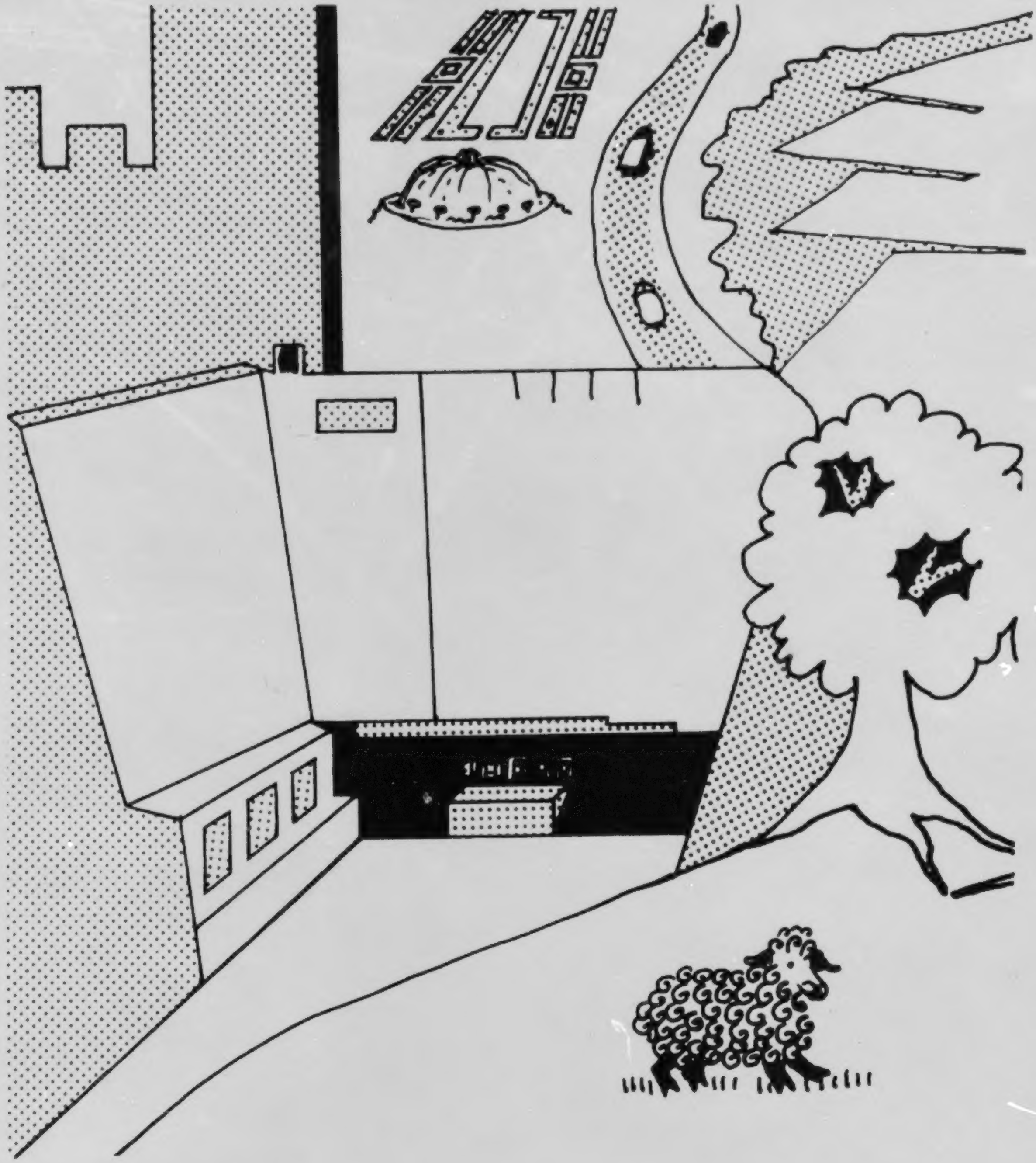
IV School District Projects



School District Projects

Each participating team in the Environmental Education Leadership Development Project was required to chronicle the history of environmental education within its school district. Under the direction of the Circuit Rider, the participating teams initiated projects which reflected the current status and future needs of their districts in environmental education. The material which follows indicates the activities of participating school districts prior to the initiation of this Project. and illustrates how the Project enabled these districts to begin to implement future directed programs in environmental education in their schools.

Aurora West High School, School District 129, 1201 West New York Street,
Autora, Illinois 60506.

Participants: Marie Hessling, Social Studies
Ken Costenson, Science

Prior to the Leadership Project, administrators at Aurora West were very concerned about the recent Illinois State school law mandating that environmental education be taught in schools. Field sites near one of the schools in the district had received public attention for its use in the school curriculum. The site had been threatened by local real estate developers but was in the process of being retained as a learning area. Finally, a new high school was being planned for the district to meet the demands of a growing school population.

During the Project, Ms. Hessling and Mr. Costenson formed an Environmental Education Steering Committee consisting of elementary and secondary teachers, administrators, and supervisory personnel. This group met several times with the Circuit Rider, and conducted a needs assessment among teachers to determine direction. This indicated the need for district teachers to take a graduate course in environmental education. Also needed was coordination of resource materials in schools teaching environmental education. Using the needs assessment, the two team members, along with the Circuit Rider, met with school officials to propose that in-service sessions in the Fall of 1975 be used to initiate the training of district teachers in environmental education. District officials accepted the suggestions and advised that plans be submitted with their approval to the In-service Curriculum Committee. As of this date, plans are being made to introduce environmental education to district teachers through fall in-service sessions. Plans are also being formulated to use the in-service sessions as a selling point for a formal course to be taught by the team members for teachers in the Aurora West district.

Simultaneously, Ms. Hessling and Mr. Costenson used the expertise of the Circuit Rider and the Project Director to make recommendations to architects planning the new school. Two meetings involving the Aurora team, the Leadership Project Director and the Circuit Rider, school officials, support personnel, and school and consulting architects resulted in plans for a new building and its school site that are compatible with teaching interdisciplinary environmental education.

Bloom Township High School, School District 206, 10th and Dixie Highway, Chicago Heights, Illinois 60411.

Participants: LaRuth Colbert, Environmental Education
Eugene Sadus, Social Studies
Sherry Balfour, Reading Specialist

For the past few years, Bloom High School offered environmental studies courses as part of the sciences curriculum. These courses always enrolled several students with low science interest and achievement. Five science teachers who attempted to teach this course were not trained in environmental education nor did they know how to teach reading. The problem was compoinded by the lack of teacher enthusiasm to teach students who were "street-wise" rather than "book-wise". LaRuth Colbert, who was to become involved in the Project, was the only teacher to obtain training in environmental education through as NSF summer institute. School officials saw the need for improvement in this area because of increased enrollment in the environmental education courses.

With the initiation of the Environmental Education Leadership Development Project, Ms. Colbert enlisted the help of Sherry Balfour, a Reading Specialist, and Eugene Sadus a Social Studies teacher. Together with the Circuit Rider, this group surveyed teachers and students directly involved with the environmental studies course. Evidence gathered from the survey indicated that: (1) the present course had to be reorganized to include social studies, (2) the training of other teachers was necessary, and (3) the reading specialist could enhance students' reading ability by utilizing the context of environmental studies. Sample units were organized which included teaching of reading and aspects of social studies as well as the science content of environmental studies. A plan was submitted and accepted by school officials to pilot one section of the environmental studies course which would involve the three team teachers.

In addition, the Bloom High School team and the Circuit Rider agreed upon the necessity to educate other teachers and counselors about environmental education. This conclusion was based upon the facts that (a) non-science teachers were interested in using some environmental education resources in their own subject area, and (b) counselors were misdirecting students to environmental studies courses. In-service workshops have been planned for this coming fall to inform counselors and non-science teachers about environmental education activities.

Bolingbrook High School, District 365-U, 350 Blair Road, Bolingbrook, Illinois 60439.

Participants: William Caton, Science
Roger Schoob, Science

Romeoville High School, District 365-U, Rt. 53 and Taylor Road, Romeoville, Illinois 60441.

Participants: Paul Johnson, Science
Robert Orlovich, Science

Bolingbrook and Romeoville High School staff members worked together as one team due to the status of environmental education in the district, and the fact that the former could serve as a district site facility. During preceding years, Romeoville High School had exceeded the student capacity and Bolingbrook High School was opened. No plans for environmental education had been made for the school curricula in this newly-reorganized district.

Participation of the district in the Environmental Education Leadership Development Project probided an opportunity for curriculum planning as well as development of a site for environmental education. Contacts were made with Social Studies teachers through school officials but these people were not interested in the Project.

During the Project, team members proposed an outdoor environmental education site at the new high school which would be used by feeder schools as well as the district's two high schools. No landscaping work had been initiated at the new high school since the structure had been built. Under the direction of the Circuit Rider, community support was gathered for the outdoor environmental education site and architectural plans were made. It should be noted that the plans were drawn by a local architect who gave his time and effort without cost. Seeds for a prairie grass, trees, and shrubs are currently being obtained for the study site, and both schools will use existing greenhouse facilities to grow plants for the site.

In addition, the Project team distributed multidisciplinary teaching materials to non-science areas for evaluation. Enthusiastic response from other teachers indicated a need for more information in the form of communications from team teachers. The above action by participants in the Project led to a needs assessment conducted in the district as well as the community. One result of this assessment was that the community became directly involved with the implementation of environmental education and the formulation of the outdoor environmental education site at Bolingbrook High School.

Crete-Monee School District 201-U, Sangamon Street, Crete, Illinois.

Participants: Elizabeth Jones, Science
Thomas Korn, Social Studies

Prior to September 1974, the Crete-Monee District, in consultation with Dr. Gallagher, began to plan and integrate environmental education into district curricula. An Environmental Education Curriculum Committee was formed and focused upon a teaching guide for environmental education produced by teachers in the district. A follow-up survey indicated that very few teachers used the teaching guide. Betty Jones, a member of the original Environmental Education Committee and one of the authors of the teaching guide, was contacted to participate in the Leadership Development Project. One objective of her participation was to gain exposure to the teaching guide and broaden the involvement of teachers.

Participation in the Leadership Project by Ms. Jones and Mr. Korn provided better communication between district teachers about environmental education. With the help of the Circuit Rider, conclusions from the teacher survey concerning the utilization and implementation of the Environmental Education Study Guide were communicated to district teachers. At the same time, clarification of the curriculum structure took place because of the increased communication. The team also planned for school site development and identified environmental education goals for the 1975-1976 school year.

As a result of the Leadership Development Project and work initiated with the aid of the Circuit Rider, Mr. Korn is planning to integrate environmental education into a World Cultures course for the Social Studies Department. Organizational plans were also made for a multidisciplinary course to be offered to the seventh, eighth and ninth grades. Betty Jones organized outdoor activities for use by seventh and eighth grade science classes. Finally, a statement of goals was developed and communicated to district teachers.

Eisenhower and Richards High School, School District 218, 5933 West 115th Street, Worth, Illinois 60482.

Participants: Nancy Carlson, Science, Eisenhower
Ken Mercury, Science, Richards

Conservation had been taught for some time at the older Eisenhower School as part of the Social Studies curriculum. Richards High School had implemented a basic ecology topic as part of the biology offerings and had a strong program in horticulture science. No coordinated effort existed between the two schools despite the fact that both are in the same district. Prior to the Environmental Education Leadership Development Project, Mrs. Carlson had been successful in developing a basic ecology course for freshmen and sophomores and Mr. Mercury had established a Nature Study Center on grounds adjacent to Richards High School.

During the Project, these two teachers decided to concentrate on implementing interdisciplinary environmental education activities in non-science areas. The Circuit Rider and Mr. Mercury introduced Project I-C-E materials to the faculty as examples of multidisciplinary environmental education activities. These materials gained wide acceptance from teachers and several faculty members agreed to introduce environmental education activities in their non-science subject areas. Nancy Carlson gathered and developed materials for non-science areas such as mathematics, physical education, foreign language, social studies, and vocational arts. She also concentrated on plans for developing an environmental education site in a concrete courtyard that was not being fully utilized. With the help of the Circuit Rider, Mrs. Carlson decided on the use of non-permanent planters. This plan was accepted by the school Curriculum and Instruction Committee. This outdoor site and initial curriculum planning mark instrumental steps in starting an interdisciplinary environmental education plan in this district.

Oswego Community Unit District 308, Route 71, Oswego, Illinois 60543.

Participants: Stephen Calhoun, Science
Michael Brock, Social Studies

Environmental education in Oswego had been taught as part of biology and to some degree in social studies, but coordinated effort had been made to include environmental education in courses at the elementary, junior high or senior high levels. In fact, most teachers in the district were not aware of the Illinois Plan for Environmental Education. Mr. James Aird, Assistant Superintendent for Curriculum and Instruction, along with Mike Brock and Steve Calhoun, was concerned about the lack of environmental education throughout the district.

During the Project, Mr. Brock and Mr. Calhoun developed and implemented a plan to involve teachers in organizing environmental education activities for their classrooms. Building committees were organized by the team.

Evaluations of commercial and non-commercial environmental education resources were made and communicated among the various building committees. A needs assessment concerning the desirability and usefulness of environmental education was conducted by the team. Results from evaluations of resources and the needs assessment indicated that district teachers desired increased availability of instructional materials for environmental education and wanted to learn more about how to teach it. The Circuit Rider provided resources for evaluation and possible questions for the assessment instrument. The success of this team and the efforts of the Circuit Rider have led to in-service environmental education courses taught by Mr. Brock and Mr. Calhoun for which enrollees may receive graduate level university credit.

DuSable High School, School District 13, 9656 South King Drive; Overton Upper Grade Center, 221 East 49th Street, Chicago, Illinois

Participants: Everett Branson, Science, DuSable
Billie Caldwell, Science, DuSable
Renee Taylor, Science, Overton

Prior to the Leadership Development Project, DuSable High School was involved with promoting an interest in horticulture. A courtyard was built containing transplanted shrubs, flowers, and exotic wildlife. The Science Department Chairperson had been the primary force behind the courtyard construction, and involvement in flower show competition. Ms. Caldwell and Mr. Branson, however, wanted to expand this interest and involvement to include ecology and values education. Ms. Taylor, at Overton, a feeder school for DuSable, became involved because of the lack of articulation between the two curricula of the schools. All three participants agreed to work on a project which would promote articulation and continuity between the two schools.

During the project, participants used the Circuit Rider as a resource person to show other teachers how to use values activities in the classroom. In addition, activities were suggested for the grade levels represented by the Project participants. The above goals were accomplished through meetings between the feeder school and the high school. Objectives and strategies for developing packets of activities for interdisciplinary environmental education were organized from these meetings. These activities focused upon the following problems: (1) litter; (2) solid waste disposal; (3) overpopulation; (4) noise; (5) violence; and (6) aesthetic improvement. Sample learning packets were developed by the participating team that emphasized these topics. Future meetings with non-science departments to implement these learning packets are planned for the coming year.

Evergreen Park High School, School District 231, 99th and Kedzie, Evergreen Park, Illinois.

Participants: Diane Kaergard, Social Sciences
Robert Mason, Science

Environmental studies was not part of this school's curriculum prior to the Environmental Education Leadership Development Project. Science and social science courses touched on environmental issues and a course entitled "Survival in a Modern World," offered by the Social Sciences Department, emphasized the environmental crisis. However, Ms. Kaergard and Mr. Mason indicated that the course lacked emphasis on solutions to environmental problems. To insure this emphasis would be included, the participating team and the Circuit Rider reorganized the course content with the Social Science and Science Departments.

During the Project, Mr. Mason and Ms. Kaergard organized a joint Science and Social Science Department meeting. The Circuit Rider attended the meeting, and for the first time materials and resources for teaching environmental education were discussed by the two departments. Non-commercial resources were loaned to the team so that an interdisciplinary course focusing upon the social studies, as well as the scientific aspect of the environmental crisis, could be developed. The course has been submitted for approval by the administration. Ms. Kaergard and Mr. Mason are hopeful that their students will become involved in this new course. The participating team has also worked toward the inclusion of ecology in other departments of the school and in the community. More meetings are being presently scheduled among the various school departments. Through such meetings, environmental education may be integrated into other school subjects.

John Hersey High School, School District 214, 1900 Thomas, Arlington Heights, Illinois 60004.

Participants: Zachary Bernard, Social Sciences
Haskell Brown, Science

Prior to the Environmental Education Leadership Development Project, environmental education in School District 214 was assigned to the Social Science Department, and later re-assigned to the Science Department. With the development of a State of Illinois Environmental Education Plan, administrators felt that environmental education should be formally organized throughout the district. Therefore, Dr. Donald Ring, District Instructional Coordinator, suggested that Mr. Zachary Bernard and Mr. Haskell Brown become involved in the Environmental Education Leadership Development Project at Governors State University as a way of infusing new ideas into the curriculum.

At the beginning of the Project, the Circuit Rider and participating team decided to plan coordinated environmental education curricula for the district. Surprisingly, this was difficult due to the flexibility existing in the district's curriculum planning. For example, in District 214 all students in grades nine through twelve could register for any course during any one year of school. Such flexible scheduling prevented the Circuit Rider and team from recommending that a specific course be implemented at any given high school level because some students might not choose to take the course at that level. Under the direction of the Circuit Rider, the participating team organized the curriculum on a continuum of activities. Awareness activities were recommended for the tenth and eleventh grade levels to be followed up with problem solving activities in the senior year. Thus, no student would repeat the same set of activities when moving to the next grade level. Meetings with Dr. Ring, other interested teachers, and administrators resulted in support of this curriculum plan. The Circuit

Rider and the participating team presented the plan to teachers during a district-wide in-service meeting. Interdisciplinary activities were formulated and sample modular teaching units were organized by the participating team. These units were developed from materials and resources directly obtained by the team during their involvement in the Project.

Lincoln-Way Community High School, School District 210, U.S. Route 30,
New Lenox, Illinois 60451.

Participants: Ronald Garrelts, Science
Ronald Olson, Agriculture

Since the fall of 1954 conservation education had been an integral part of the agriculture curriculum at Lincoln-Way. The Science Department had also included conservation topics in a few course offerings, and in 1970 the Social Studies Department began to include environmental education in its course offerings. However, prior to the Environmental Education Leadership Project, no coordinated effort existed for integrating environmental education into all school subjects. Under the direction of Mr. Ronald Olson, the Agriculture Department at Lincoln-Way initiated a successful recycling program, a cooperative effort involving the science clubs and the teachers of the four local junior high schools, and the faculty and students at the high school. In addition, a Christmas tree recycling program was started by an Environmental Action class in 1973. Trees were mulched by a local company and the mulch was given to citizens for use in their gardens or flower beds. For efforts such as those described above, Mr. Olson was selected as Illinois Conservation Teacher of the Year in 1974.

During the Leadership Project Mr. Garrelts and Mr. Olson began to work toward coordinating the teaching of environmental education between the Science and Agriculture Departments. Materials, resources, and a needs assessment were used to communicate and, subsequently, develop a coordinated teaching strategy. In addition, the participating team developed a district-wide environmental education center at the high school to assist local elementary and junior high teachers. Fourth year agriculture students under the supervision of Mr. Olson developed environmental education presentations for use at the high school site. Eighteen acres of the school campus were developed into an effective outdoor laboratory. Curriculum adjustments were recommended by the team to other departments in the school which involved the use of the outdoor laboratory facilities. Nature trails were outlined and marked, and learning stations were built to help the community use the outdoor facilities.

Orland Park Junior High School, School District 135, 14825 West Avenue,
Orland Park, Illinois 60462.

Participants: William Spear, Science

In the Fall of 1971, District 135 established a committee to integrate environmental education into the sixth, seventh, and eighth grade science curricula. Teacher interest in this development prompted Mr. William Spear and Ms. Jean Smith of Orland Park Junior High School's Science Department to contact Mr. Wayne Schimpff who is associated with the Open Lands Project. To meet the district teachers' needs, he initiated an environmental education in-service course under the auspices of the National College of Education, Chicago, Illinois. The course was so well received that Mr. Schimpff, Mr. Spear, and Ms. Smith coordinated an outdoor environmental education in-service program for Orland Park teachers.

While working with Mr. Schimpff, Mr. Spear and Ms. Smith were also participating in the Environmental Education Leadership Development Project. Consequently, the Circuit Rider became involved in the organization of the in-service session. Due to participation in similar projects at other universities, Ms. Smith felt compelled to drop out of the Project. Mr. Spear continued, however; and in the Spring of 1975, he, the Circuit Rider, and Mr. Schimpff conducted a series of overnight camping trips for students and teachers of Orland Park at Camp Falcon. Multidisciplinary activities were used during these sessions. For example, art objects were created using various kinds of rock and mineral material; a cemetery was visited to determine the history of the region; and the Circuit Rider conducted simple water quality experiments. Teachers in District 135 heard of the program's success, and through Mr. Spear and Ms. Smith, expressed a desire to learn more about environmental education. Thus, an in-service course using many of the activities developed or utilized in the on-campus workshops has been organized. This is an excellent example of the "multidisciplinary-effect" organized into the Environmental Education Leadership Development Project.

Rich Township High School, Central Campus, School District 227, 203rd and Governors Highway, Olympia Fields, Illinois.

Participants: James Wessendorf, Social Science
James Hohbach, Science

In the fall of 1972, the course "Environmental Studies" was first offered at Rich Central. It utilized an interdisiciplinary approach in which science and social studies teachers taught during two different class periods. In addition, various environmental topics were treated in social studies courses throughout the district. For example, sociology courses considered population and urban ecology, and other ecological topics were a part of the biological and physical science courses. However, no required course extensively emphasized environmental education topics, and as a result, some students received a minimum or no exposure to environmental education.

The basic Environmental Studies course was updated and rewritten during the Environmental Education Leadership Development Project. Activities were individualized into packets for students enrolled in the course. New materials and individualized activities which focused upon learning environmental education outside the classroom and school were suggested by the Circuit Rider. The participating team incorporated activities of the affective domain into the improved course plans. Also, increased articulation between the three high schools in District 227 occurred because the participating team was used as an important resource from which district teachers could gather valuable information concerning development of an interdisciplinary course.

Rich Township High School, East Campus, School District 227, Sauk Trail and Westwood Drive, Park Forest, Illinois 60466.

Participants: Ron Guagenti, Science
Ray Janota, Science

A year-long science course for high school freshmen and/or sophomores existed at Rich East. Ecology was part of this course; however, no coordinated effort was used by the course teachers. Mr. Janota and Mr. Guagenti were, first of all, concerned about improving this part of the course. In addition, both participants were sensitive to the need for an advanced course in environmental education stressing values, concepts, and facts. A similar upper-level course had been organized at another school in the Rich Township system but no such course had been considered at Rich East.

During the Environmental Education Leadership Development Project, an eighteen week semester course for the first two high school levels was organized in a step-wise fashion. It began with a rationale/philosophy statement. Specific objectives were listed along with instructional activities, materials, resources, and evaluation items. This organizational outline resulted from the cooperative efforts of the science division chairman, the science staff, and the Circuit Rider. The administrators were so impressed with this product that a summer school course was accepted and taught during 1975 as a precursor to the eighteen week course. Mr. Janota and Mr. Guagenti will be teaching the course this fall for freshmen and sophomores.

The summer school course had some interesting experiences, including a week-long workshop offered in environmental education at Governors State

University. Mr. Janota and Mr. Guagenti involved the students with the teachers attending the workshop. This provided an unusual and worthwhile opportunity for teachers and high school students to experience cooperative learning. Many teachers had the opportunity to evaluate almost immediately the impact environmental education activities had upon high school students. In addition, teachers and students had the invaluable experience of sharing environmental education. This experience could not have taken place without the involvement of Mr. Guagenti and Mr. Janota in the Environmental Education Leadership Development Project.

Thornwood High School, School District 205, 170th and South Park, South Holland, Illinois 60473.

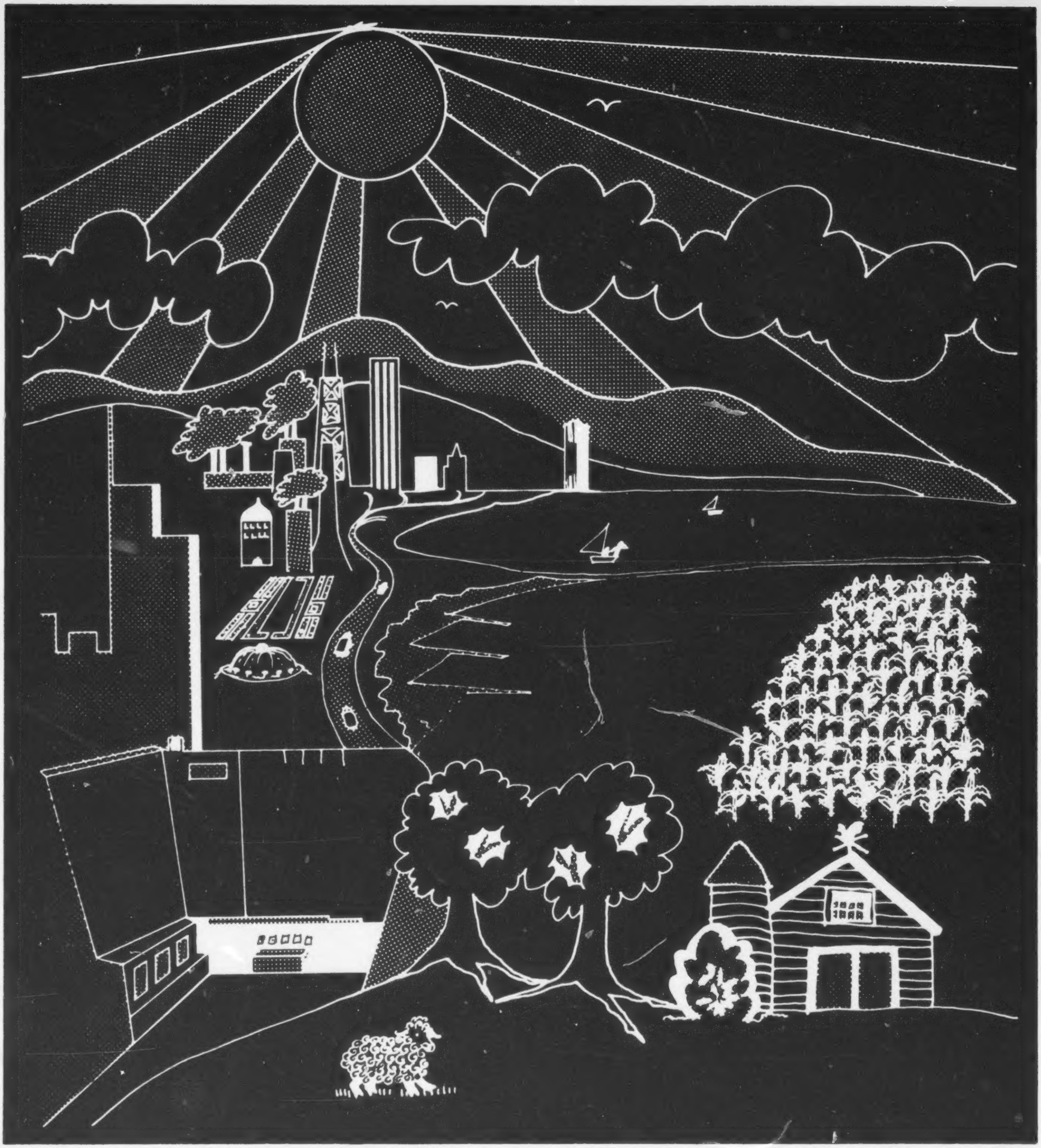
Participants: George Beaver, Science
Jere Palmgren, Social Science

Thornwood High School did not have a strong environmental education program prior to the Environmental Education Leadership Development Project. A district wide committee had been assembled to consider the organization of a conservation and environmental education course. As a result, a summer school ecology course was developed but it never attracted enough student enrollment to permit the course to be taught. Because of ongoing interest in developing such a program, Mr. George Beaver and Ms. Jere Palmgren became involved in the Environmental Education Leadership Development Project.

Under the direction of the Circuit Rider, a proposal containing detailed plans for the implementation of an interdisciplinary environmental education course was submitted to the Board of Education. The course was accepted by the Board and plans were made to offer "Man and his Environment" for the 1975-1976 school year. One condition of acceptance was that forty-five students would pre-enroll for the course by the close of school in June 1975. The quota was not reached, and lack of communication to prospective students has been speculated as the reason. The Project team speculated that "science" students were afraid of the social studies requirements and "social studies" students were afraid of the science requirements. Fall registration may produce the required quota.

Mr. George Beaver and Ms. Jere Palmgren also developed plans for an environmental education study site. The team constructed crude drawings for the site. A landscape architect provided formal blueprint drawings of the site free of charge. Cost estimates for planting hardwoods, softwoods and shrubs were made by a local nursery. A student licensed to drive large machinery owned by his parents' company agreed to provide necessary earthmoving. Funding for the project took the form of plant sales, donations from the local Junior Women's League, car washes and bake sales. The two most interesting money raising efforts were: (1) "adopt a tree" donations from faculty and (2) a Dominick's Supermarket benefit day where a certain percentage from a designated day of sales was donated to the effort. Through these activities work in the environmental site has begun.

V Evaluation



Procedures and Data

Project personnel planned from the outset a multifaceted evaluation approach. Data were collected in four general forms: (1) a pre- and post-test given to the Project's participating teachers which examined attitudes toward the use of teaching strategies for environmental education; (2) a post-test given for participants and a control group which evaluated value preferences toward environmental issues; (3) individual evaluations of each workshop to obtain immediate feedback and plan subsequent workshops; and (4) a log kept by the Circuit Rider of each district environmental education project which showed impact of the program in cooperating districts. These projects have been described in the previous part of this monograph. The material which follows discusses the results of the first three approaches of the evaluation for the Project.

Results from the pre- and post-test evaluations indicated that the Leadership Project may have affected attitudes toward teaching strategies for environmental education. Participants reacted positively toward more student-centered teaching methods as the year progressed. However, the assessment instrument was locally developed and had low reliability. Thus, results are somewhat questionable but the instrument is being revised to improve both validity and reliability.

The second study was a post-test control group and it produced some interesting results. Project participants exhibited a stronger preference of humanistic values in environmental issues rather than theoretical or technological value preferences. Significant differences were obtained between participants and the control group. Since no pre-test was given to the Project participants, the results of this quasi-experimental study cannot totally be attributed to the Project activities. These same results, however, do imply that value preferences may be changed because of experiences had during in-service workshops.

Evaluations provided by participants at the end of each workshop indicated a general acceptance of all the on-campus meetings. These workshops, described in Section III of this monograph, involved a number of activities ranging from lectures, laboratory activities, simulations, values clarification procedures, information gathering at the University, and field trips. Data collected by use of a questionnaire (See Appendix A) indicated that teachers enjoyed in-service sessions which contained some didactic teaching group, interactive strategies, and individual time for learning. Teachers, however, did not prefer to make choices when more activities were planned than they could engage in; they preferred to attend all workshop activities rather than make decisions on which options to attend or miss. Participants also indicated that a question and answer period should be scheduled for participants to interact with each speaker. Project participants thoroughly enjoyed sessions where an opportunity was given to challenge, question, and trade concepts with professors and others who made presentations.

Although somewhat irrelevant, it is interesting to note that coffee and refreshments, provided at the start of workshops as well as dinner during the on-campus meetings, provided evidence of a humanistic concern which was appreciated by participants. This socializing enhanced the workshop experiences.

Outcomes

Too often new concepts in education, such as environmental education, fail to reach the secondary classroom level because colleges and universities teach these concepts from a theoretical approach rather than practical application. As a result, secondary teachers see no relevance between these new concepts and the activities which are carried on daily in their classrooms. New concepts are seen only as part of a university course requirement which do not relate to daily high school instruction. This is seen in the limited degree to which science teachers implemented the new National Science Foundation courses after participating in summer or year-long institutes. Most participants in these institutes returned to their own classes and made few changes in the curriculum or their instructional practices. What seemed to be lacking was some form of continued support or contact. Continued support was one factor written into the Environmental Education Leadership Development Project.

The Circuit Rider provided contact between a new concept being taught at a university and secondary classroom teachers participating in the Project. In addition, a "multiplier-effect" was planned into the Project. The "multiplier-effect" would occur when participants in the Project, along with the Circuit Rider, trained other teachers in in-service sessions on environmental education.

The Environmental Education Leadership Development Project can be considered a success because it combined these two factors: (1) new environmental education concepts were implemented into curricula with the support of the Circuit Rider and (2) other teachers were trained using the "multiplier-effect." Several districts organized environmental education curricula under the supervision of trained teachers and University personnel. Those districts which had already initiated environmental education programs used the Project to upgrade and expand existing programs. Participating teachers who had experience with implementing programs provided valuable resource information for those teachers without experience. In fact, experienced teachers were often called upon to help Project personnel suggest methods to start environmental education programs and overcome barriers. The Project, then, was a success in terms of convincing teachers and school districts that environmental education is a viable program which can be made part of school curriculum.

The Project could also be labeled a success in terms of the numbers of non-participating teachers who learned about environmental education through district-wide in-service sessions organized by the participating teams and the Circuit Rider. These sessions provided opportunities for Environmental Education Leadership Development Project participants to use skills, content material, and teaching strategies learned in the Project. Many of the activities used in the workshops were repeated in these in-service sessions. Also, these sessions provided a forum for organizing formal course work in environmental education. At least two participating teams have organized formal environmental education courses for the in-district teachers for the Fall of 1975. Team participants from Oswego and Orland Park are presently teaching such a course for other teachers. Plans for courses beginning in the Spring of 1976 have been made by other teacher participants. Through such efforts the "multiplier-effect" has not only been accomplished, but also has been shown to be a viable plan for implementing environmental education.

Another result, indicative of success, was the organization of materials and resources used during the Project. These materials and resources purchased or gathered from participating teachers were catalogued into a central file. This file was used by participants, teachers in other classes offered by the University, and, most importantly, by non-university people interested in a community nature center or influencing environmental education through Parent-Teacher Organizations have used the file to obtain information. Awareness of this extensive resource and materials file was spread by the participants. Thus, success of the Project can also be measured in terms of the information disseminated about available resources and materials.

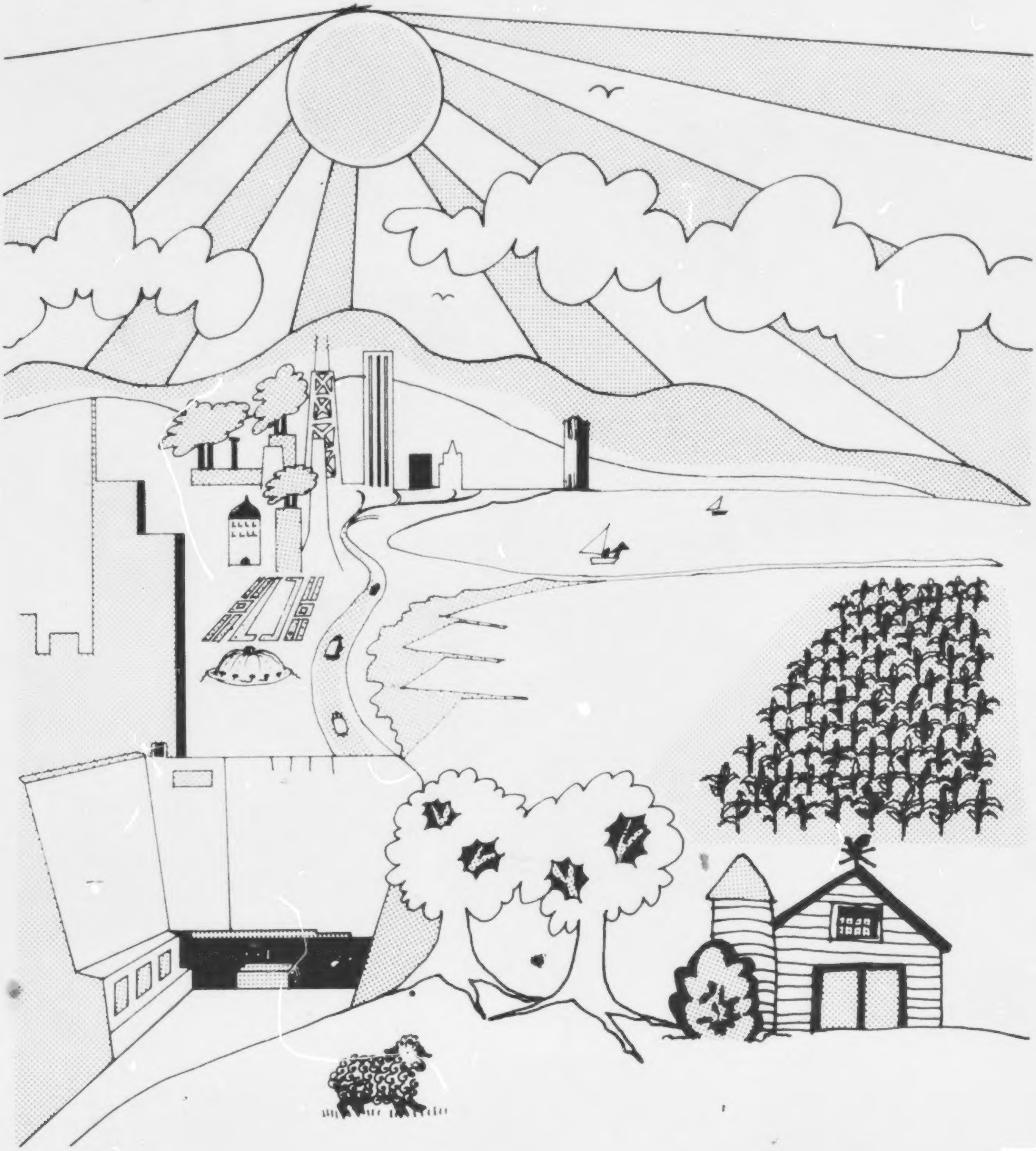
The successful outcome of the Project can also be measured in terms of objective results implied from instruments used in evaluating the Project, and by the continued activities of teacher participants. Another significant appraisal of the workshops was provided by the continued high level of attendance of participants who came on their own time after having taught much of the day, staying until after 10:00 P.M., driving up to one and one-half hours (perhaps longer on our Illinois winter nights) to reach home, and then returning to teach in their own school the next morning at 7:30 or 8:00 A.M. During the year only one of the thirty-five original participants failed to continue with the Project; that person enrolled in a doctoral program at another university. No matter which criteria are used, the Environmental Education Leadership Development Project can be labeled as a successful method for fostering implementation of environmental education in secondary schools.

Suggestions

After completing the interactions of the entire Project, the following suggestions are offered for organizing a series of successful workshops:

1. Provide a workshop director and staff that is totally committed to giving support and leadership that will strengthen environmental education.
2. Implement the Circuit Rider concept to offer individual assistance to participants.
3. Provide an informative and stimulating format of activities and interactions.
4. Be courteous and sensitive to the physical needs of the participants and staff to keep them comfortable.
5. Follow through in all aspects of the workshops and in all situations involving the participants' requests and problems (even after the official completion date of the project).

VI Appendices



APPENDIX A

LEADERSHIP DEVELOPMENT PROJECT

WORKSHOP PARTICIPANT PERCEPTIONS

This form was designed to provide feedback which reflects your individual perceptions. Please respond to each question in this manner.

Workshop title: ____

Date: ______________________ Instructors: ______________________

____

The following information is optional unless otherwise directed.

Your name: ____

City, Zip: ______________________ School: ______________________

Directions:

For each item below, report the single most appropriate response.

_____ The ideas presented were mostly:
(1) facts
(2) general relationships and concepts
(3) procedures and processes

_____ Which ONE of the following materials were most often used in the workshop?
(0) no materials were used
(1) study outlines
(2) copies of articles and readings
(3) films, film-strips
(4) audio or video tape presentations
(5) special manipulative materials
(6) tools and equipment
(7) programmed instruction
(8) sample curriculum materials
(9) other materials not listed above

_____ Which ONE of the following activities best describes the workshop:
(1) supervised practice
(2) "on-location" field experience
(3) "hands-on" activities
(4) discussions involving participants and instructor
(5) lectures-demonstrations by instructor
(6) independent study
(7) micro-teaching
(8) simulations--role playing
(9) other activities not listed above

_____ In general, activities required me to:
(0) no tests or assignments were given in this workshop
(1) reproduce facts and opinions only
(2) apply workshop ideas to new situations
(3) create a product, plan or approach using workshop ideas
(4) evaluate applications of the workshop ideas
(5) combine workshop ideas (sometimes with other ideas) into a new solution (or application)

_____ Your interest in the workshop was influenced by the instructor:
(1) initial lack of interest continued throughout
(2) my interest increased
(3) my interest decreased
(4) I was interested throughout the workshop

_____ Most of the time in this workshop I felt that:
(1) I listened to the teacher lecture, give directions, or answer questions
(2) We had a group discussion
(3) I practiced doing something with the instructor's supervision (or assistance)
(4) I worked alone without any help from the instructor

_____ Which of the following best described your reaction to this workshop:
(1) I learned a lot of useless information
(2) I learned some worthwhile ideas
(3) It was just another workshop. I could take it or leave it.

_____ During the workshop, my questions were answered:
(1) more elaborately than necessary
(2) completely and willingly
(3) were not answered
(4) I did not ask any questions

_____ The materials and activities utilized:
(1) were mostly digressions from the content
(2) provided amplification
(3) were an integral part of the content

_____ During this activity, what the instructor said and did:
(1) helped me understand something difficult or confusing
(2) made things seem more difficult or confusing
(3) had little effect on my understanding of the content

_____ The ideas presented in this workshop were:
(1) mostly new to me
(2) some new, some familiar
(3) ideas I already knew

_____ The pace of this workshop was:
(1) too fast for me to acquire all the ideas
(2) about right for me
(3) too slow for me

_____ The level of the content was:
(1) easy for me
(2) appropriate for me
(3) difficult for me

_____ This workshop was:
(1) fun
(2) bearable
(3) a pain

_____ Rate your commitment:
(1) I will not pursue further the ideas presented
(2) I am interested in the ideas presented
(3) I am interested and will try a few of them
(4) I will try most ideas and will look for more

Name one outstanding "element" of the workshop

____

Name one "element" which could have been omitted:

____

What were the purposes of this workshop as you perceived them:

____

APPENDIX B

Adapted from:

CURRICULUM THEMES, STATE OF ILLINOIS
PLAN FOR ENVIRONMENTAL EDUCATION
(Unpublished, Unofficial 1973)

The Illinois Office of Education has taken leadership in developing a State Plan for Environmental Education. A Task Force was appointed and drafts of a Plan have been prepared which include sections on curriculum, teacher education, facilities, dissemination networks and continuing education. The plan is an excellent one, containing input from a broad range of disciplinary and multidisciplinary scholars and people with practical knowledge.

A very important segment of the proposed plan is the content structure of the curriculum which is described below:

> Curriculum planning for any subject is a complex process. It involves deciding what is to be taught, how it can be taught most effectively, and how to determine if students have learned what you hope they will. Although these three elements of curriculum planning may seem simple on first glance, more careful analysis shows that each is difficult and time-consuming.
>
> The task of curriculum planning for environmental education is, in many ways, more difficult than the task of planning a curriculum for one of the standard school subjects. Most have a disciplinary basis which can serve as a guide in deciding what should be taught. Environmental education does not have this advantage; it draws from many disciplines. Almost everything can be considered as part of the environment. Consequently, its scope is so broad as to defy convenient organization. Because of this fact, the content of environmental education is, in some degree, unmanageable. Moreover, environmental education has its historical roots in subject matter, such as Nature Study and Natural History, which is not as readily conceptualized as disciplines like botany or economics. Further

complicating the matter is the fact that many people who teach in fields related to environmental education, like their colleagues who teach single-discipline-based subjects, have fallen victim of our society's infatuation with specialization and, consequently, have begun to lose sight of broader picture of environmental education. As a result, each person tends to view environmental education with his own speciality as the central focus surrounded by a few related elements.

In the proposed State Plan for Environmental Education in Illinois, the Task Force members worked to overcome the difficulties described in the previous paragraph. By identifying five broad themes, provisions have been made for:

(a) a broad framework of ideas that will prevent narrowness of point of view;
(b) guideposts for selecting and determining content; and
(c) basis for organizing content of environmental education.

In short, these broad themes provide a framework, a starting point, for curriculum planning.

Without further elaboration, however, these five themes will be of little value in curriculum planning because they are too general. Each theme must be made more explicit so that teachers, curriculum planners, and others engaged in designing instruction can more clearly understand the intent of these broad, general statements. To clarify the themes, the Task Force members agreed on several objectives related to each. These objectives represent knowledge, attitudes, and skills that are required of an environmentally literate citizenry capable of sound environmental action. In other words, the objectives specify what citizens should know, feel, and be capable of doing about their environment.

Following are the five themes and several objectives related to each.

THEME I: INTERDEPENDENCE

Living beings depend on each other and on nonliving things.

A person capable of sound environmental action should:

(a) be able to describe and give examples of the interdependency of living things.

(b) be able to explain the O_2 - CO_2, water, nitrogen, and other biogeochemical cycles and state how each is essential to the continuation of life.

(c) understand that all living things modify their environment, but the process of natural selection, which does not operate fully for humans, tends to minimize the destructive impact of species on the environment.

(d) understand that the earth is a finite system; and be able to describe several implications of this fact.

(e) understand and be able to give examples of natural food webs; and further be able to indicate consequences when an element of a food web is eliminated.

(f) be able to describe natural factors which tend to limit population of any species.

(g) appreciate diversity among living beings, and value this diversity both for its esthetic quality and as one means of assuring continuity of life on earth.

(h) begin to formulate an ecocentric value set in which respect for the natural environment and its diversity is a fundamental element.

(i) appreciate the natural environment for its esthetic beauty.

(j) know and exhibit behaviors consistent with his ecocentered values.

THEME II: PEOPLE'S IMPACT

People have developed the capacity to modify the environment in ways which alter natural biogeochemical cycles.

A person capable of sound environmental action should:

(a) understand that humans, as a species, are dependent on natural biogeochemical cycles for the fundamental elements of their existence.

(b) understand that the human cerebrum provides capabilities not possessed by other species, but responsibilities are a consequence of these capabilities.

(c) be able to describe two dichotomous points of view about the relation of humans and other living beings; be able to state several implications of each view.

(d) be able to describe the effects of technology and industrialization on human population growth and consequent effects on the natural environment, the constructed (man-made) environment, and the quality of life.

(e) be able to describe the effects of technology and industrialization on human rates of consumption of materials and its consequent effects on natural biogeochemical cycles.

(f) understand that most material goods which people consume are produced at some cost to the natural environment; and be able to classify these costs as (1) consumed renewable resources, (2) consumed nonrenewable resources, (3) pollution effects due to production, and (4) pollution effects attributable to use and ultimate disposal of the product when it is no longer useful.

(g) understand that sources of most common pollutants and how some forms of pollution can be detected and measured; be able to perform some simple tests to measure environmental pollution.

(h) understand some technological ways of reducing pollution, such as tertiary sewage treatment, automobile pollution control devices, alternatives to internal combustion engines in automobiles, smoke precipitation, materials cycling, and using solid wastes as sources of fuel or building materials.

(i) be able to describe causes, advantages, and disadvantages of various population concentrations as found in urban, suburban, and rural areas.

(j) understand that most humans depend on technology for survival.

(k) be able to give examples of ways in which people have altered natural biogeochemical cycles and describe some of the consequences thereof.

(l) recognize some human modifications of the natural environment are reversible while others may be irreversible.

(m) be aware that we do not fully understand the effects people have on the environment.

(n) begin to formulate an ecocentric value set supportive of our understanding and use of the natural and the constructed environment.

(o) select from among alternatives those actions and behaviors which will have minimal deleterious impact on natural biogeochemical cycles.

THEME III: MAINTENANCE

Human resources and energy are required to maintain environments that have been modified or constructed by people.

Environmentally literate persons should:

(a) understand that unless outside energy is supplied to reverse the tendency, any system will become increasingly disordered.

(b) understand that natural environments are self-renewing; that is, solar energy engenders a natural succession of renewal.

(c) recognize that environments modified or built by people require continual maintenance if they are to remain orderly.

(d) understand that maintenance requires input of energy.

(e) understand that the total cost of any environmental modification or structure must include the cost of its maintenance.

(f) appreciate that all people have responsibilities to themselves, others and the total environment because each person exists at some cost to the environment.

(g) understand that resources, both renewable and nonrenewable, should be husbanded.

(h) develop a positive attitude toward the need for maintenance.

(i) exhibit behavior which helps to maintain their environment.

THEME IV: QUALITY OF LIFE

The quality of human life is affected by the natural environment, people's modifications of the environment and their values.

A person capable of sound environmental action should:

(a) be able to describe human motivations beginning with basic needs of survival and safety and leading up to higher order needs such as need for a feeling of worth (e.g., A. Maslow's Theory of Human Motivation).

(b) understand that human survival needs, including health, food and shelter, have been satisfied with increasing effectiveness through the applications of science and technology.

(c) understand that most gains in meeting survival needs have been achieved with negative impact on the environment.

(d) appreciate that science and technology, and consequent industrialization and urbanization, have exerted less influence on people's ability to satisfy higher order needs than survival needs; be able to give examples where urbanization and industrialization have enhanced and impeded satisfaction of higher order needs.

(e) appreciate the constructed (man-made) environment, its diversity, strengths and weaknesses, as well as the reasons it has developed as it has.

(f) understand that the quality of life for most people is significantly affected by the quality of the constructed environment.

(g) appreciate the beneficial and deleterious effects of contacts with the natural or constructed environment on psychological well-being.

(h) be able to describe ways in which various types of human modifications of the environment have had both beneficial and detrimental effects on the quality of life.

(i) be aware that a person's definition of quality of life depends on his values; be able to formulate a tentative definition of quality of life.

(j) begin to formulate a value set in which quality of human life, quality of the environment and person values are related; exhibit behaviors which are consistent with the value set.

(k) exhibit behaviors which lead to improvement of the quality of life for himself and those around him.

THEME V: IMPROVEMENT

People's effects on the environment and the quality of life of their lives are a result of values, behaviors, and ability to organize resources.

An environmentally literate person should:

(a) understand that people's behaviors are influenced by their values and their intellectual and physical resources.

(b) understand that all humans are interdependent on other people, and all are dependent on other living and nonliving things for survival.

(c) appreciate that every person has responsibilities to (1) himself, (2) other humans, and (3) the total environment, because each person exists at some cost to the environment, including other humans.

(d) recognize that many of our current values and consequent behaviors are incompatible with maintenance of either a high-quality environment or a high quality of life.

(e) understand that resources, both renewable and nonrenewable should be husbanded.

(f) understand that many economic, social, and political constraints influence our behaviors.

(g) acquire skills for effective, responsible decision-making on matters relating to quality of life and quality of environment.

(h) have a basic working knowledge of governmental processes and agencies that have been established to prevent and cope with environmental problems.

(i) have developed understandings and skills for using legal and political processes for minimizing detrimental influences on the environment.

(j) understand elements of environmental planning and value it as a way of preventing and/or resolving environmental problems.

(k) recognize that human modification of the natural environment should be done prudently and with careful consideration of alternatives and consequences, both immediate and long-range.

(l) understand that people must carefully control factors which tend to modify the environment, such as population growth, consumption of resources, disposal of wastes, and alteration of biogeochemical cycles.

(m) appreciate that substantial investment and utilization of economic and human resources will be required to retard detrimental environmental modification; further appreciate that the investment will improve people's health and the quality of their lives.

(n) begin to formulate a value set which is supportive of coordinated actions and personal behavioral changes needed to retard current rates of detrimental environmenal modification.

(o) exhibit behaviors which will tend to retard and ultimately reverse current rates of detrimental environmental modification.

(p) develop a life style which is ecologically defensible, especially with reference to (1) minimal consumption of resources, (2) minimal interference with natural cycles, (3) minimal production of non-biodegradable wastes, and (4) maximum concern for all components of the ecosystem.

The themes and objectives listed represent a beginning step in curriculum planning for environmental education — that of determining the scope and nature of the content.

APPENDIX C

Advisory Committee

The members of the Advisory Committee were:

Dr. Ted F. Andrews, Dean, College of Environmental and Applied Sciences, Governors State University, Park Forest South, Illinois.

Dr. Tom Boldrey, Director, National Demonstration Center for Career Education, Joliet Public Schools, Joliet, Illinois

Dr. James Buckenmeyer, Assistant Dean, College of Business and Public Service, Governors State University, Park Forest South, Illinois.

Mr. Tom McCollum, Curriculum Development Specialist, Office of the Superintendent of Public Instruction, Springfield, Illinois.

Dr. Donald Ring, Coordinator of Mathematics and Science, District 214, Mt. Prospect, Illinois.

Dr. John Savage, Superintendent, District 201U, Crete, Illinois.

APPENDIX D

A LIST OF ENVIRONMENTAL GAMES AND SIMULATIONS

Audobon Perception Sets: Short exercises in environmental awareness with emphasis on principles, processes, and personal participation. The games are printed on small folders (one set contains 8 games). 25¢; Golden Gate Audobon Society, 1749 Grove St., Berkeley, California 94709.

Balance. junior high to college; 20-35 players; time, 3 weeks in 1 hour rounds. A simulation game with players taking roles of members of the community involved in ecological issues. Students do outside research between sessions. $10.00; Interact, P.O. Box 262, Lakeside, California 92040.

Baldicer: junior high/high school; 10-20 players; time, 2-4 hours. The game simulates the problem of feeding the world's people by acting as food coordinators. The players experience the interdependence of world economy. $25.00; John Knox Press, Box 1176, Richmond, Virginia 23209.

Beat Detroit: children to adults; 4-6 players; time, 60-90 minutes. The players must travel 50,000 miles in their new car before going broke or the car falls apart (played like Monopoly). No one may win if all the cars are recalled. $8.00; Dynamics Design Inc., Anaheim, California 92803.

Clean-Up: ages 4-10; 2-6 players; time optional. Game develops an anti-litter consciousness. Player moves from block to block, removing trash, planting trees, grass and flowers in his neighborhood. The one who does the most to beautify the town without falling down, wins. $5.00; Damon Educational Division, 80 Wilson Way, Westwood, Massachusetts 02090.

Community Game: junior high/high school; 2-4 players; time optional. Player begins with a family of two and a supply of resources and money. They will encounter both man-made and natural phenomena which affect the environment; and they will attempt to formulate the concept of environmental balance. $36.00 (set contains 8 games); Prentice-Hall, Educational Book Division, Englewood Cliffs, New Jersey 07632.

Control: junior high/high school; 30 or more players; time optional. Problem is an uncontrolled river that flows through the area. Players form groups as members of the community and promote involvement through community action and understanding of problems related to undeveloped natural resources. $1.00; Roger G. Thompson, Reh Putnam High School, Milwaukie, Oregon 97222.

Dirty Water: upper grade school/adult; 2-4 players; time optional. Each player is the water pollution commissioner of an industry surrounded a lake. The person who most effectively anticipates pollution problems, avoids overpopulation, manages their finances wisely and counters up-stream pollution wins. $10.00; Damon Educational Division, 80 Wilson Way, Westwood, Massachusetts 02090.

Ecology: The Game of Man and Nature: age 10-adult; 5-10 players; time, 1-3 hours. The game involves players achieving a balance between man's activities and the natural environment while traveling through the four ages of development; hunting, agriculture, industrial, and environmental. $10.00; Damon Educational Division, Urban Systems, Inc. 1033 Massachusetts Ave., Cambridge, Massachusetts 02138.

Environmental Issues: A Courtroom Simulation: senior high school; 25 or more players; time, 2 weeks. Game is designed to acquaint students with laws, lawsuits, courtroom activity and the relationship between the law and environmental questions. The procedures require the participants to prepare either for or against a controversy of local origin. The entire legal procedure is simulated from research through jury trials. Free; Environmental Education Coordinator, Bureau of Land Management (220), U.S. Department of the Interior, Washington, D.C. 20240.

Extinction: junior high and beyond; 2-8 players; time, 1-2 hours. Players populate the island of Darwinia with seven genetic variations and prey on vulnerable species. Game demonstrates evolution, natural selection, and dynamic equalibrium of a system. $11.95; Sinauer Associates, Inc. 20 Second Street, Stamford, Connecticut 06905.

Frustration: A Waste Water-Treatment Game: junior high/high school; players number optional; time, optional. A short simulation showing the various steps necessary to establish wastewater treatment facilities. Free. Clifford A. Gale, Biology Dept., Cazenovia High School, Cazenovia, New York 13035.

Futurity: high school; 15-30 players in teams; time, 3-6 hours, in 1 hour rounds. Students are placed in a growing world population, where the need for adequate food, water and shelter are used as parameters in making 20-year plans. Changes in the quality of life occur with every round. $20.00; Alt Associates, 55 Wheeler St., Cambridge, Massachusetts 02138.

The Game of Sacrifice: junior high/high school; 10-30 players, time, optional. Players assemble in interests groups (consumer-voters, manufacturers, public utility executives). The group is given environmental problems to solve. The scores are not competitive, but used only for comparisons. The game can only be used once. $4.95; Educational Ventures, 209 Court Street, Middleton, Connecticut 06457.

Grasslands: upper elementary to college; 1-2 players; time, 1-2 hours. Simulation of the grassland ecosystem. Factors like cattle, weather, meadowlarks, and grasshoppers help determine an ecological balance. Free. Simulation/Gaming/News, Vol. 1, No. 4, Nov. 72, pp. 10-12.

Graphigame: Environmental Attitudes: junior high/high school; 25 and more players; time, optional. Surveys to help students examine group attitudes, discuss issues and learn surveying and graphing techniques. Game can be used in class or for a community survey. $3.75; Educational Ventures, 209 Court Street, Middleton, Connecticut 06457.

The Great Ecology Jigsaw Puzzle: any age; any number of players; time depends on skill. A 500 piece puzzle features the beautiful ecology symbol of the Philadelphia Ecology Club. $4.00; Damon Educational Division, 80 Wilson Way, Westwood, Massachusetts 02090.

Indian Valley: upper junior high school; 20 or more players; time, optional. Students put into practice some of the principles which professional forest managers use. Students divide into teams, each representing a different interest in forest land use, and one represents a multiple-use committee. Teams decide what to do with the forest, and present plans to committee. Game kit contains a map, set of directions for each team, sheets for scoring, and directions for the teacher. Free. American Forest Institute, 1619 Massachusetts Avenue, N.W., Washington, D.C. 20036.

Land Use: junior high/high school/ 1-30 players; time, 2 hours and over; The game brings out the conflict between the desire to have quality housing and the desire to have natural resources. In developing land, participants discover concepts of cluster zoning, planned unit development, and others. $7.95; Educational Ventures, 209 Court Street, Middleton, Connecticut 06457

Land-Use Simulation: high school; 10 players and more; time, optional. Students decide what to do with a one-square mile of country farm land four miles from the city. Class divides into groups to prepare a plan for the land. One group is the Board of County Commissioners, who must make the decision based on the presentations by the other groups. Investigating Your Environment Series, U.S. Forest Service, Portland, Oregon 97208.

A Look at our Environment: late junior high/high school; 15 and more players; time, optional. A multi-media unit designed to help students identify problems of environmental abuse, and to do some research locally. Game involves role-playing, case-studies, research, games. Student text is called "Mike's World--Your World," 75¢ per copy. Teacher's Guide with pre and post tests and project ideas is 50¢. Educational Ventures, 209 Court Street, Middleton, Connecticut 06457

Natural Selection: junior high/high school; 15-25 players; time, 1 hour. A simulation showing the processes of natural selection using colored backgrounds. Students select as many insects as possible in 20 seconds. Free; Published in The Science Teacher, Vol. 36:1, Jan. 1969, p. 68.

New Highway: junior high/high school; 20-25 players; time, several 1 hour sessions. Students adopt various roles, each with a different idea of what to do about an unsafe and congested highway. Groups lobby for power before having a public hearing. $4.95; Educational Ventures, 209 Court Street, Middleton, Connecticut.

New Town: high school; 4-10 players; time, 1-3 hours. The players' goal is to build a new community from the ground up. Players bid for land, construct various kinds of buildings, hold meetings, vote, trade, etc. $16.00; for 10 student kits; $28.00 for 20 student kits. Harwell Association, Box 95, Convention Station, New Jersey 07961.

Open Space: juniot high/high school; 10-15 players; time, 2 hours. A debate is conducted among groups as to what to do with an available parcel of undeveloped land. The teacher's guide provides a way of tabulating how successful groups are at arriving at decisions. $4.95; Educational Ventures, 209 Court Street, Middleton, Connecticut 06457.

Planet Management Game: junior high to college; designed for five players but can accommodate up to 30; time, optional A computer designed stimulation of existing conditions on the planet Clarion. Players make decisions to improve the population, income, food and environment; this game is considered to be one of the most accurately simulating existing conditions on a planet like Earth. $12.75; Houghton Mifflin, Co., 110 Tremont St., Boston, Massachusetts 02107.

Predator-Prey: junior high/high school; 2-4 players; time, 1-2 hours. Game includes survival, food chains, food webs, and ecological balance. Each person tries to be the best predator possible and then traces the changes in the predator and prey populations under different circumstances. $6.00; Urban Systems, Inc., 1033 Massachusetts Avenue, Cambridge, Massachusetts 02138.

The Pollution Game: junior high to college; 25-30 players; time, 1-3 hours. Students play government officials, manufacturers, and workers, and community citizens. Student workers produce paper airplanes during a work peried, creating pollution. Manufacturers sell planes to the government and decide if and how to deal with the pollution. The game is very open-ended and designed freely. Published in The Science Teacher, Oct. 1972, p. 52

Population: A Game of Man and Society: ages 12 to adult; 2-6 players; time, 2-3 hours. Game involves filling a pyramid with just the right balance of industry, agriculture, medicine, education, and population. $10.00; Urban Systems, Inc. 1033 Massachusetts Ave., Cambridge, Massachusetts 02138.

The Pollution Game: junior high to college; 2-6 players; time, 1-3 hours This is an environmental Monopoly game. It is meant to be played by competing teams of players, though it does work for individuals. $9.80. Houghton Mifflin Co., 110 Tremont St., Boston, Massachusetts 02107.

The Redwood Controversy: junior high to college; 15-45 players; time, 2-3 hours. Players act as legislators, experts, and pressure groups. The game is based on actual Senate hearings; 21 students are given specific roles; the others are senators. Game points up that land-use problems involve conflicts between ecological, financial, and political interests. $7.95; Houghton Mifflin Company, 110 Tremont St., Boston, Massachusetts 02107.

Smog: junior high/high school; 2-4 players; time. 1-2 hours. A board game in which students take the role of a city administrator of air quality, concentrating on maintaining air quality, and also staying in a favorable position with respect to votes, money, and municipal growth. $10.00; Urban Systems, Inc. 1033 Massachusetts Avenue, Cambridge, Massachusetts 02138.

Winter Wildlife Ecology Game: junior high; 2-4 players; time, optional. Students are either 1 or 2 predator species or 4 prey species which are involved in a struggle for existence through the winter. Players move by means of dice and a spinner or a game board. Game is a good method for simulating the conditions of these animals during the winter. For information, Dr. R. Prosnell, University of Wisconsin, Green Bay, Wisconsin 54301.

Portsville: high school; 6 per map board, 4 map boards per 30 students; time 1-1/2 to 2 weeks. This interactive simulation game for team play emphasizes strategic thinking and cooperation by having the students build the city of Portsville in three different time periods. Components of game are board, manuals, lego modular pieces, map board, map, and data sheets. Game is an integral part of unit 1 of Geography in an Urban Age, and cost for 30 students is $139.55. The Macmillan Company, 866 Third Avenue, New York, New York 10022.

W.A.L.R.U.S. (Water and Land Resources Use Simulation): junior high to adult; 5-35 players; time, 4 hours to 2 weeks. $50.00 Urbex Affiliates, Inc. 474 Thurston Road, Rochester, New York 14619.

Pollution: Negotiating a Clean Environment: junior high to college; 4 to 8 players; time, 1-3 hours. The game involves students with role-playing and permits them to experience and cope with trade-offs between personal or corporate goals and environmental quality. Materials include manual, board, tokens, role cards, and issue cars. $22.50 for four complete sets of materials, including teachers manual and overhead transparencies. Instructional Development Corp., P.O. Box 805, Salem, Oregon 97308.

Clug (Community Land Use Game): high school and college; 3-15 players divided into 3-5 teams; time, 3-20 hours in 30 minute periods. Players act like private enterprise entrepreneurs in buying and selling land to construct commercial or residential properties. Game teaches the classical principles of urban and regional economics. $75.00 for complete kit which includes dice, board, manuals, play money, playing forms and pieces. Producers: The Free Press, Dept. F., Riverside, New Jersey 08075, and Urbex Affiliates, Inc. 474 Thurston Road, Rochester, New York 14619.

No Dam Action: An Ecology-Water Resource Simulation: junior high to college; 20-40 players; time, about 2-4 weeks. In this interactive simulation, 18 major problems are involved, each having a broad base of alternatives. Problems range from recreational water use to water purity standards. Each problem requires personal, group, and inter-group endorsement, yielding over 100 different soltuions. Materials which include manuals, role cards, playing cards, group and problem information cost $85.00. Instructional Simulations, Inc. 2147 University Ave., St. Paul, Minnesota 55114.

The Dynasty Game: junior high/high school; 4 or more players, in 4-8 teams; time, 2 hours or more. Players represent the Emperor, upper class and lower class social positions in an agricultural society. They make decisions regarding social, economic, and political problems in order to move up the social ladder. Materials include manuals, game board, cards, and playing pieces. $15.00, commercial game; $30.00,educational game; Dynasty International, Inc. 815 Park Avenue, New York, New York 10021.

Arctic Islands Petroleum Exploration: upper elementary to high school; 4-35 players in 4-6 teams; time, 1-3 hours in 30 minute periods. This interactive play emphasizes individual and team competition, as well as cooperation. Players represent shareholders or executives of an oil exploration company and learn how to deal with oil and gas exploitation. Materials include manual, dice, cards, playing forms, and game maps. $10.00; Canada Social Sciences Services, P.O. Box 7095, Postal Station "M" Edmonton, Alberta, Canada.

Disunia: junior high to college; 35 players in 7 teams; time, 3 weeks in 1 hour rounds. Game provides traditional research activities with role-playing in a simulated environment on a new planet where members form seven new states in the year 2087. Materials are manuals, map, pressure cards, and playing forms. $10.00 for 35 players; Interact, P.O. Box 262, Lakeside, California 92040.

City Council: 6th to 10th grades; 18-35 players; time, 8-12 minutes in 30 minute rounds. Players take roles of council members and residents of a community, making decisions regarding law enforcement, pollution, hiring of a city manager and other issues. $5.00 from Simile II, 1150 Silverado Road, La Jolla, California 92037.

City Council: high school to college; 20-35 players in teams; time, 2-4 hours. Players in roles of citizens, city officials, and planners seek to re-develop a 16-block area of high-density population and poor-quality housing. Emphasis placed on decision-making, bargaining, and compromising. Complete set, $50.00; sample set, $3.00; Paul S. Amidon and Assoc., 5408 Chicago Avenue South, Minneapolis, Minnesota 55417.

Dig: junior high to college; 15-35 players; time, 15 to 30 hours. Players are divided into 2 teams with the task of secretely creating two cultures. They write descriptions of the hypothetical civilizations, stressing the interrelationship of cultural patterns. Artifacts are designed, constructed and placed in the ground. The other team excavates, restores, and analyzes the remains of the unknown culture. $10.00 for 35 players; Interact, P.O. Box 262, Lakeside, California 92040.

Impact: junior high to college and management/administration; 20 to 40 players, time, 8-10 hours in 15-30 minute rounds. A multi-problem/multi-group simulation. Players represent various civic groups in a community who try to solve social issues, power roles, and social status; materials include manuals, profile sheets, portfolios, city map, and an information center. $160.00; Instructional Simulations, Inc., 2147 University Avenue St. Paul, Minnesota 55114.

Tracts: junior high to college, community groups; 12-40 players in 4 teams; time, 2-4 hours. Teams represent the planning commission, private land developers, industrial users, and urban housing interests. Players are exposed to conflicts when land cannot serve equally the interest of all parties without compromise and negotiation. Materials include manuals, scoring forms, and land value cahnge forms. $39.00; Instructional Simulations, Inc., 2147 University Avenue, St. Paul, Minnesota 55114.

Spring Green Motorway; junior high/high school; 23 to 48 players; time, unknown. This simulation emphasizes the need for cooperation within a conflict-ridden situation. Game familiarizes players with the decision process surrounding a typical community issue such as a proposed super-highway running through their village. Cost unknown; Community Service Volunteers, Toynbee Hall, 28 Commercial St., London, England 6BR, England.

World Game: junior high to adult; 3-26 players divided into 1-9 teams; time, 5 days to 3 months. Players act out roles of world planners and environmental developers in order to develop a strategy devoted to man's survival on "Spaceship Earth." Materials are "lift-off" manual, map playing board, slides, game tokens. $15.00; Spaceship Earth Exploration by Design Science, P.O. Box 909, Carbondale, Illinois 62901.

Community Decision Games: junior high to college; 6-36 players in 6 teams; time, 3 hours in 3 rounds. This series comprises four games: Budgets & Taxes, New Highway, New Schools, and Open Space, each of which is designed to help players anticipate, understand, and deal with conflicts over community problems. Materials include instructor's manual, posters, decision cards for 4 games. $4.95 for each game; Education Ventures, Inc., 209 Court Street, Middleton, Connecticut 06457.

Outdoor Survival: A Game About Wilderness Skills: junior high to adult; 2-4 players or 2-4 teams; these fine games; Lost, Survival, Search, Rescue, and Pursue are played on one game board that represents woods, mountains, rivers, lakes, etc. Games seek to teach students such outdoor basics as where to look for food and water, what risks to take, and use of possible support materials. $10.00; Stackpole Books, Cameron and Kelker Sts., Harrisburg, Pennsylvania 17105.

Population: junior high/high school; 1-24 players in 2-4 teams; time, 45 minutes-2 hours. Players begin with equal resources and compete to "save" the largest population. A population is saved when its total number is matched or exceeded by the player's overall accummulation of life-sustaining elements (LSE's.) Directional cards are used as chance-factors. $15.95 includes manuals, board, cards, and pegs. Meridian House, Inc., 21 Charles St., Westport, Connecticut 06880.

Sacrifice: junior high to college; 5 to 60 players in 5-10 teams; time, 1-2 hours. An interactive simulation based on cooperative effort by individuals within teams. Game helps students to gain experiences in negotiation, presenting views, making decisions, toward the goal of understanding the complexity of the environmental problems involved. Components of game are manual, scenarios, role cards, playing forms, IBM cards, pre and post-tests. $4.95; Education Venture, Inc., 209 Court St., Middleton, Connecticut 06457.

Earth Cooperate: junior high to adults; 10-30 (possible 45) players; time, 30-60 minutes. Simulation game that involves competition and cooperation where players can examine their own behavior and emotions about physical goods distribution. Materials include beads, shoelaces, objective cards and choice sheets, whistle, and instruction sheets. $27.00; without materials, $5.00; R. Dlugosz, 2929 N. 36th St., #50, Phoenix, Arizona 85018.

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